BAY AREA AIR QUALITY MANAGEMENT DISTRICT

2010 Air Monitoring Network Report

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Definition of Terms

ADT ……. Average Daily Traffic
AGL ……. Above Ground Level
AQS ……. Air Quality System; the EPA national air quality database
Air District …… Bay Area Air Quality Management District (BAAQMD)
BAM …… Beta Attenuation Monitor, a type of continuous $PM_{2.5}$ monitor
CARB …… California Air Resources Board
CFR ……. Code of Federal Regulations
CO …… Carbon Monoxide
CH_4 ……. Methane
DL …… (Tree) Drip Line
EPA ……. U. S. Environmental Protection Agency
FEM ……. Federal Equivalent Method
FRM ……. Federal Reference Method
GC ……. Gas Chromatograph
GIS ……... Geographic Information System
HC …… Hydrocarbons, including CH_4 and NMHC
HiVol …… High Volume
H_2S ……. Hydrogen Sulfide
ICPMS ……Inductively Coupled Plasma Mass Spectrometry
Maintenance Plan.. A Plan submitted by states to EPA that outlines how the NAAQS will be maintained for a particular region.
MSA ……. Metropolitan Statistical Area
NAAQS …… National Ambient Air Quality Standards
NATTS …….. National Air Toxics Trends Stations
NCore ..……. National Core (Monitoring Program)
NMHC …….. Non-methane Hydrocarbons
NO ..……... Nitric Oxide
NO_2 ……... Nitrogen Dioxide
NO_x ……... Oxides of Nitrogen
NO_y ……... Total Reactive Nitrogen
O_3 ……... Ozone
PAMS ……. Photochemical Assessment Monitoring Stations
PPB ……. Parts per billion
PM ……. Particulate Matter
$PM_{2.5}$…… Particulates less than or equal to in size
$PM_{2.5F}$ …… $PM_{2.5}$ measured using a filter-based monitor
$PM_{2.5C}$ …… $PM_{2.5}$ measured using a continuous monitor
PM_{10} ……... Particulates less than or equal to 10 microns in size
PM_{10C} ……… PM_{10} measured using a continuous monitor
$PM_{10-2.5}$ …….. PM Coarse. PM less than or equal to 10 microns and greater than 2.5 microns in size
SATMP …….. School Air Toxics Monitoring Program

Definition of Terms (continued)

SIP ……. State Implementation Plan – A Plan submitted by states to EPA that outlines how the NAAQS will be met for a particular region.
SLAMS ……. State or Local Air Monitoring Station
SO_2 ……..... Sulfur Dioxide
SPM …… Special Purpose Monitor
STN …… Speciation Trends Network
TAMS……. Total Atmospheric Mercury
VOC ……... Volatile Organic Compound

Overview of Network Operation

Network Design

The Bay Area Air Quality Management District (Air District) is the public agency responsible for air quality management in the nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma. The Air District operates air monitoring stations in each of these nine counties. The Air District began measuring air quality in the San Francisco Bay Area in 1957. In 2010 there were 29 air monitoring stations in the Air District air monitoring network including one station operated by the California Air Resources Board.

Twenty-four of the 29 stations are classified by EPA as State and Local Air Monitoring Stations (SLAMS) that are permanently sited and meet all EPA monitor siting criteria. The remaining five are classified as Special Purpose Monitoring (SPM) stations that do not meet EPA siting criteria (Crockett), measure a pollutant for which there are no siting criteria (Fort Cronkhite), or are short-term monitoring sites (Berkeley and Cupertino/Cupertino MV).

Short-term monitoring sites are re-locatable trailers and shelters with a comprehensive set of air quality instruments to characterize local air quality. Instruments at these sites are operated on SLAMS sampling schedules for a minimum of one year allowing data comparison with permanent monitoring sites. Statistical data relationships between short-term and nearby permanent sites provides long-term estimates of air quality at temporary monitoring sites.

The Air District also performs air monitoring as part of other programs. These include programs that the Air District has initiated, such as meteorological monitoring, the ambient toxics program, and the West Oakland studies; or programs required by EPA. EPA programs currently include the Cupertino School Air Toxics Monitoring Program, the National Air Toxics Trends Stations (NATTS) Program, the National Core (NCore) Program, the Photochemical Assessment Monitoring Stations (PAMS) Program, and the $PM_{2.5}$ Speciation Trends Network (STN) Program. Summaries of these programs can be found later in this report.

The San Francisco Bay Area contains over 100 cities. Although resources do not allow placement of air pollution monitors in every city, it can be demonstrated that air pollution levels, in the absence of significant local sources, are similar within each geographical region of the Bay Area. That is, cities within each of the major valleys of the Bay Area can have similar air quality levels. Consequently, a few sites can characterize an area. Generally, locations for permanent air monitoring sites are initially based on knowledge of population density and local wind patterns, while the final site selection is determined after analyzing preliminary air quality measurements collected from field studies, temporary monitoring studies, and mobile monitoring data.

The purpose of the Air District monitoring network is:

- To provide air pollution data to the general public in a timely manner.
- To support compliance with California and national ambient air quality standards. When sites do not meet the standards, attainment plans are developed to attain the standards.
- To support air pollution research studies.

To meet its monitoring objectives the Air District monitoring network collects ambient air data at locations with a variety of monitoring site types. These site types, as defined in 40 CFR Part 58, Appendix D, Table D-1, are intended to characterize air pollution levels in areas of high pollution, high population, transported air pollution, and air pollution near specific sources.

Ambient air monitoring at Air District stations is intended to meet one or more of the following monitoring objectives:

- A determination of typical concentrations in areas of high population density.
- A determination of the highest concentrations expected to occur in the area covered by the network.
- A determination of impacts from significant sources.
- A determination of general background concentration levels.
- A determination of the extent of regional pollutant transport.

Population Oriented

The primary purpose of air quality standards is to protect the public health. Air monitoring stations are placed in areas with high population density to evaluate exposure to air pollution. In most cases, stations are located within the largest cities in each county. Because people spend more time at home than at work, air monitoring sites are generally located in residential areas rather than at downtown locations. To be consistent with EPA's list of Site Types in Table D-1 of 40 CFR Part 58, the term "population orientated" will be used in place of "typical concentrations in areas of high population density", for clarity in this monitoring objective.

Highest Concentration

EPA regulations require that air quality in areas where the public has access be reduced to levels below the national ambient air standards. Consequently, monitoring must also be done at locations expected to have the highest concentrations, even if populations are sparse in that area. High concentrations may be found close to major sources, or further downwind if pollutants are emitted from tall stacks. High concentrations may also be found at distant downwind locations when the pollutants such as ozone or secondary particulate matter are a result of chemical reactions in the atmosphere.

Source Impact

There are five refineries within the Air District: Chevron, Shell, Tesoro, ConocoPhillips, and Valero. Because these sources have the potential to emit significant amounts of SO_2 and

H_2S, the Air District operates SO_2 and H_2S monitoring stations near these sources. When the monitors downwind of the source show concentrations above the applicable standards or exceed concentrations listed in Air District Regulation 9, Rules 1 and 2, a notice of violation may be issued to the source. The Port of Oakland also can be a significant source of particulates, CO, and toxics and the Oakland West air monitoring station is located downwind of the Port to measure pollution impacts on West Oakland.

General Background

The Air District operates stations in areas that have no significant emissions from mobile, area, or industrial sources. At these sites, the measured concentrations reflect the transported air quality levels from upwind areas. When designing control strategies to reduce pollution levels, it is important to know if areas outside the boundaries of the Air District are contributing to high pollutant levels within the Air District. Where there are no significant emission sources upwind of a site, then the site is considered to be a general background site.

Regional Transport

The Air District shares a common boundary with six other air districts: Monterey Bay Unified APCD, San Joaquin Valley APCD, Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Lake County AQMD, and Northern Sonoma County APCD. When upwind areas have significant air pollution sources, pollutants may be transported into the Bay Area Air District and result in overall higher air pollution levels in the Bay Area. The Air District operates monitoring stations near the borders of the Air District to measure the air pollution concentrations transported into and out of the Bay Area Air District.

Each monitoring objective is associated with a spatial scale for each site. For example, a regional transport site is meant to represent air quality levels over a large area, while a highest concentration site may represent a spatial scale of no more than a few blocks or so, in size. Spatial scales are defined in 40 CFR, Part 58, Appendix D. They are: micro scale – having dimensions of several meters up to 100 meters; middle scale – having dimensions of 100 meters to 0.5 km; neighborhood scale – having dimensions of 0.5 km to 4.0 km; urban scale – having dimensions of 4 to 50 km; and regional scale – having dimensions of up to hundreds of km. Table 1 lists the appropriate scales for each monitoring objective.

Table 1. SLAMS Monitoring Objectives and Appropriate Spatial Scales.

Monitoring Objective	Appropriate Spatial Scale
1. Highest Concentration	Micro, middle, neighborhood
2. Population Oriented	Neighborhood, urban
3. Source Impact	Micro, middle, neighborhood
4. General Background	Urban, regional
5. Regional Transport	Urban, regional

The desired spatial scale of a monitoring site must conform to established criteria for the distance from roadways, based on traffic volumes. There are different distance requirements

for each pollutant, which can be found in 40 CFR Part 58, Appendix E. Additionally, the spatial scale can also be affected if trees or obstructions are too close to the monitoring probe. The goal in siting monitoring stations is to match the spatial scale with the desired monitoring objective. Table 2 lists the stations, their monitoring objectives, and the pollutants measured at each site.

Table 2. List of Monitoring Stations within the Air District for 2010.

Site	Station Name	Type[1]	Monitoring Objective	Pollutants Monitored[1]
1	Bethel Island	SLAMS	Regional Transport& Highest Concentration	O_3, NO_x, SO_2, CO, PM_{10}, Toxics
2	Concord	SLAMS	Population Oriented, Highest Concentration	O_3, NO_x, SO_2, CO, HC, PM_{10}, $PM_{2.5F}$, Toxics
3	Fairfield	SLAMS	Population Oriented & Regional Transport	O_3
4	Fremont	SLAMS	Population Oriented	O_3, NO_x, CO, HC, $PM_{2.5C}$, Toxics
5	Gilroy	SLAMS	Population Oriented, Highest Concentration, & Regional Transport	O_3, $PM_{2.5C}$
6	Hayward	SLAMS	Population Oriented & Regional Transport	O_3
7	Livermore	SLAMS	Population Oriented & Highest Concentration	O_3, NO_x, HC, $PM_{2.5F}$, $PM_{2.5C}$, Speciated $PM_{2.5}$, Toxics
8	Los Gatos	SLAMS	Population Oriented & Highest Concentration	O_3
9	Martinez	SLAMS	Source Impact	SO_2, Toxics
10	Napa	SLAMS	Population Oriented	O_3, NO_x, CO, PM_{10}, $PM_{2.5C}$, Toxics
11	Oakland	SLAMS	Population Oriented	O_3, NO_x, CO,, $PM_{2.5C}$, Toxics
12	Oakland West	SLAMS	Population Oriented & Source Impact	O_3, NO_x, SO_2, CO, $PM_{2.5C,}$ Speciated $PM_{2.5}$, Toxics
13	Point Reyes[2]	SLAMS	General Background	$PM_{2.5C}$
14	Point Richmond	SLAMS	Source Impact	H_2S
15	Redwood City	SLAMS	Population Oriented	O_3, NO_x, CO, $PM_{2.5F}$, $PM_{2.5C}$, Toxics
16	Richmond 7th	SLAMS	Source Impact	SO_2, H_2S, Toxics
17	Rodeo	SLAMS	Source Impact	H_2S
18	San Francisco	SLAMS	Population Oriented	O_3, NO_x, CO, HC, PM_{10}, $PM_{2.5C}$, Toxics
19	San Jose	SLAMS	Population Oriented & Highest Concentration	O_3, NO_x, SO_2, CO, HC, PM_{10}, $PM_{2.5F}$, $PM_{2.5C}$, Speciated $PM_{2.5,}$ Toxics
20	San Martin	SLAMS	Highest Concentration	O_3
21	San Pablo	SLAMS	Population Oriented	O_3, NO_x, SO_2, CO, PM_{10}, Toxics

Site	Station Name	Type[1]	Monitoring Objective	Pollutants Monitored[1]
22	San Rafael	SLAMS	Population Oriented	O_3, NO_x, CO, PM_{10}, $PM_{2.5C}$, Toxics
23	Santa Rosa	SLAMS	Population Oriented	O_3, NO_x, CO, $PM_{2.5C}$, Toxics
24	Vallejo	SLAMS	Population Oriented	O_3, NO_x, SO_2, CO, $PM_{2.5F}$, $PM_{2.5C}$, Speciated $PM_{2.5}$, Toxics
25	Berkeley	SPM	Population Oriented & Source Impact	O_3, NO_x, SO_2, CO, HC, PM_{10}, $PM_{2.5C}$, Toxics
26	Crockett	SPM	Source Impact	SO_2, Toxics
27	Cupertino	SPM	Population Oriented & Source Impact	PM_{10C}
28	Cupertino Monte Vista Park	SPM	Population Oriented & Source Impact	O_3, NO_x, SO_2, CO, PM_{10}, $PM_{2.5C}$, Toxics, TAMS
29	Fort Cronkhite	SPM	General Background	Toxics

[1] See page 5 for acronym definitions.
[2] Operated by the California Air Resources Board.

EPA suggests that the appropriate spatial scale for population oriented sites should be neighborhood or urban. Using the current EPA methodology to determine spatial scales, the air monitoring sites in Napa, Oakland, San Pablo and San Rafael would be characterized as middle scale. However, the Air District believes the spatial scale of the site would be better characterized as neighborhood scale. This is because EPA's distance requirements from roads are based on 1979 vehicle emission levels. Current fleet average vehicle emission factors in the Bay Area are 95% lower for hydrocarbons, 95% lower for CO, 82% lower for NO_x, and 48% lower for PM_{10} in 2009 compared to 1979.

Figure 1 is a map of the 2010 Air District SLAMS and SPM monitoring sites. Tables 3 through 7 lists the minimum number of monitors required within the network for each pollutant. The section following Table 7 describes recent changes to the monitoring network and proposed changes to the monitoring network.

The final section provides detailed descriptions of the monitoring objectives for each air monitoring site and a brief explanation for choosing the type of monitor at each site.

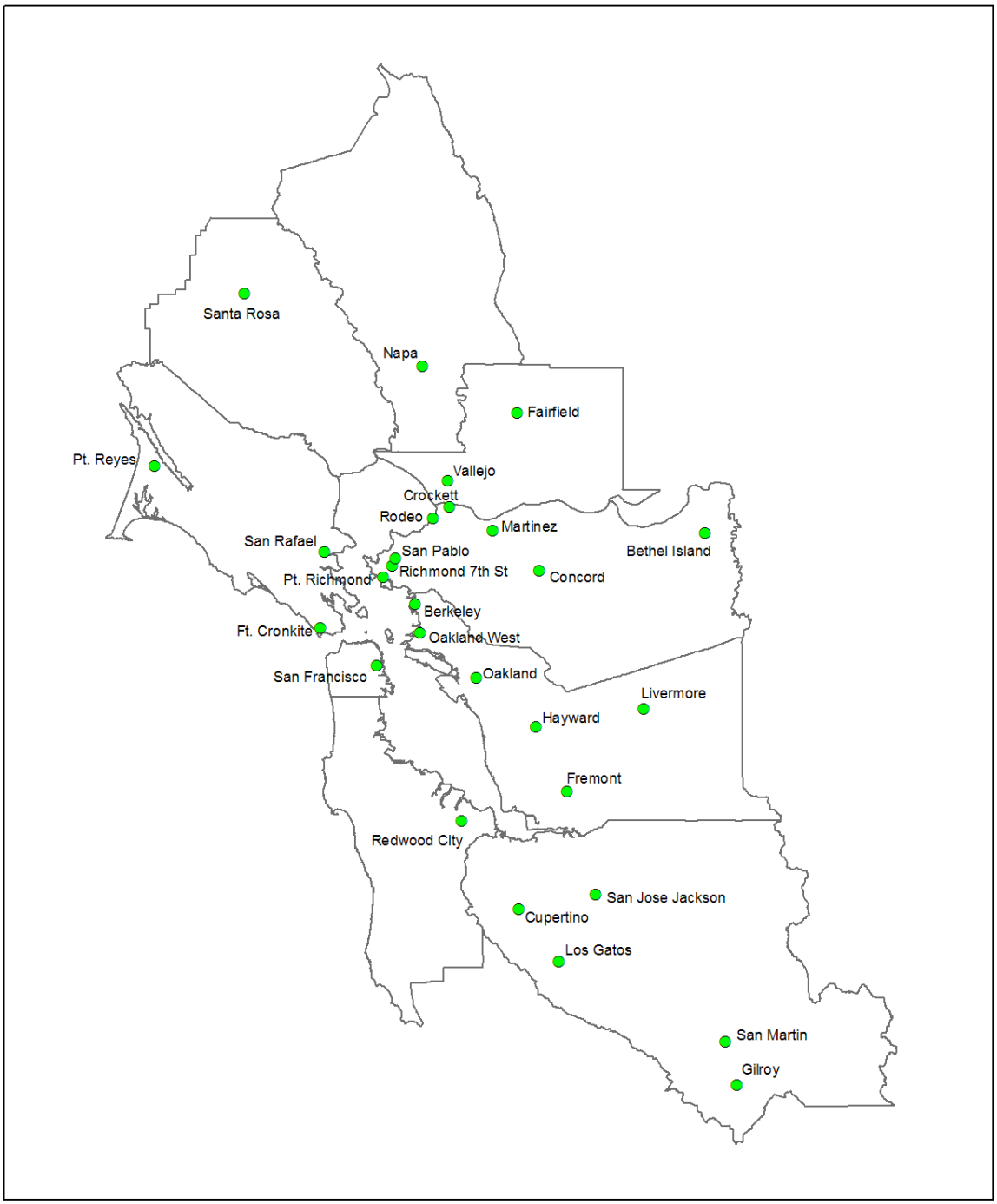

Figure 1. Map of Air District SLAMS and SPM Sites for 2010.

Minimum Monitoring Requirements for SLAMS Sites

Minimum Monitoring Requirements for Ozone

The number of required ozone monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-2 of 40 CFR Part 58, Appendix D – SLAMS Minimum O_3 Monitoring Requirements. Ozone design values are a calculated concentration (see footnote [a]) which are used for comparison with the national standard to determine the attainment status of an area for that pollutant. Table 3 shows that the Air District monitoring network meets or exceeds the ozone minimum monitoring requirements. No additional monitors have been required in the State Implementation Plan (SIP) or Maintenance Plan for ozone.

Table 3. Minimum Monitoring Requirements for Ozone SLAMS Sites.

MSA	County	Population (2010)	8-hour Design Value[a] (ppb) 2010	Number of Monitors Required	Number of Monitors Active	Additional Monitors Needed
San Francisco-Oakland-Fremont	SF, Marin, Alameda, San Mateo, Contra Costa	4,335,391	80	3	8[c]	0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1,836,911	75	2	5	0
Santa Rosa-Petaluma	Sonoma	483,878	54	1	2	0
Vallejo-Fairfield	Solano	413,344	71[b]	2	3	0
Napa	Napa	136,484	66	1	1	0

[a] Design values are calculated at each monitoring site by taking the 3-year mean (2008-2010) of the 4th highest 8-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the 0.075 ppm National Ambient Air Quality 8-hour Ozone Standard meet the standard.

[b] The highest 8-hour design value is from Vacaville which is operated by Yolo-Solano APCD. The highest design value within the BAAQMD in this MSA is 69 ppb at Fairfield.

[c] The Fremont station was closed on 10/31/10 and is not included in this total.

Minimum Monitoring Requirements for $PM_{2.5}$

The number of required $PM_{2.5}$ monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-5 of Appendix D to 40 CFR Part 58 – $PM_{2.5}$ Minimum Monitoring Requirements. $PM_{2.5}$ design values are a calculated concentration (see footnotes [a] and [b]) which are used for comparison with the national standard to determine the attainment status of an area for that pollutant. Table 4 shows that

the Air District monitoring network meets or exceeds the $PM_{2.5}$ minimum monitoring requirements.

EPA designated the Bay Area as nonattainment of the $PM_{2.5}$ standard on October 8, 2009. The effective date of the designation is December 14, 2009 and the Air District has three years to develop a State Implementation Plan (SIP) to demonstrate the Bay Area will achieve the revised standard by December 14, 2014. The SIP for the $PM_{2.5}$ standard must be submitted to EPA by December 14, 2012.

Table 4. Minimum Monitoring Requirements for $PM_{2.5}$ SLAMS Sites.

MSA	County	Population (2010)	Annual Design Value[a] ($\mu g/m^3$) 2010	Daily Design Value[b] ($\mu g/m^3$) 2010	Number of Monitors Required	Number of Monitors Active	Additional Monitors Needed
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4,335,391	9.1	30	3	6[d]	0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1,836,911	10.2	30	3	3	0
Santa Rosa-Petaluma	Sonoma	483,878	8.0	26	1	1	0
Vallejo-Fairfield	Solano	413,344	9.1	31	1	1	0
Napa	Napa	136,484	N/A[c]	N/A[c]	0	0	0

[a] Annual design values are calculated at each monitoring site by taking the 3-year mean (2008-2010) of the annual averages for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the national $PM_{2.5}$ annual standard of 15 $\mu g/m^3$ indicate the area meets the standard.

[b] Daily design values are calculated by taking the 3-year mean (2008-2010) of the 98th percentiles for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the national $PM_{2.5}$ 24-hour standard of 35 $\mu g/m^3$ indicate the area meets the standard.

[c] There are no FRM or FEM $PM_{2.5}$ monitors in Napa County.

[d] The Fremont station was closed on 10/31/10 and is not included in this total.

Minimum Monitoring Requirements for PM_{10}

The number of required PM_{10} monitors for each MSA in the Bay Area is determined by its population and design value, as specified in Table D-4 of Appendix D to 40 CFR Part 58 – PM_{10} Minimum Monitoring Requirements. PM_{10} design values are a calculated concentration (see footnote [a]) which are used for comparison with the national standard to determine the attainment status of an area for that pollutant. Table 5 shows that the Air

District monitoring network meets or exceeds the PM_{10} minimum monitoring requirements. No additional monitors are required for the State Implementation Plan (SIP) or Maintenance Plan because the Bay Area has never been designated as non-attainment for PM_{10}, and no SIP or Maintenance Plans have been prepared for PM_{10}.

Table 5. Minimum Monitoring Requirements for PM_{10} SLAMS Sites.

MSA	County	Population (2010)	Design Value[a] 2010	Number of Monitors Required	Number of Monitors Active	Additional Monitors Needed
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4,335,391	0	2	5	0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1,836,911	0	2	2	0
Santa Rosa-Petaluma	Sonoma	483,878	0	0	1	0
Vallejo-Fairfield	Solano	413,344	0	0	1	0
Napa	Napa	136,484	0	0	1	0

[a] For PM_{10}, the design value is defined as the expected number of exceedances per year, which is calculated by averaging the number of exceedances for the past three years (2008-2010). Since there were no exceedances in the past three years, the PM_{10} design value is zero for all MSA's within the Bay Area Air Quality Management District where PM_{10} is measured. The 24-hour standard (150 $\mu g/m^3$) is attained when the design value is less than or equal to one.

Minimum Monitoring Requirements for SO_2

In early 2010, 40 CFR Part 58, Appendix D, Section 4.4 stated that there are no minimum requirements for the number of SO_2 monitoring sites. No additional monitors are required for SIP or Maintenance Plans, because the Air District has never been designated as non-attainment for SO_2, and no SIP or maintenance plans have been prepared for SO_2. At the end of 2010 the Air District operated nine permanent SO_2 monitors in its network.

On June 22, 2010 EPA revised the monitoring requirements for SO_2 to include source impact monitoring near major SO_2 sources. These changes took effect on August 23, 2010 and are reflected in Table 6 below.

Table 6. Minimum Monitoring Requirements for SO_2 SLAMS Sites in 2013.

MSA	County	Population (2010)	Daily Design[a] Value (ppb) 2010	Number of Monitors Required	Number of Monitors Active	Addi-tional Monitors Needed
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4,335,391	19	2	6	0
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1,836,911	N/A[b]	1	1	0
Santa Rosa-Petaluma	Sonoma	483,878	-	0	0	0
Vallejo-Fairfield	Solano	413,344	7	0	1	0
Napa	Napa	136,484	-	0	0	0

[a] Daily design values are calculated at each monitoring site by taking the 3-year mean (2008-2010) of the 4th highest daily maximum 1-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the national SO_2 1-hour standard of 75 ppb meet the standard.

[b] Insufficient data available for Design Value calculations.

Minimum Monitoring Requirements for NO_2

On February 25, 2010 EPA revised the minimum monitoring requirements for NO_2 in 40 CFR Part 58, Appendix D, Section 4.3. By January 1, 2013, the Air District must operate NO_2 monitors at population-oriented sites and at sites within 50 meters of major freeways.

Based on Bay Area population and traffic counts, the Bay Area will need to operate at least two monitors sited to measure the area-wide NO_2 concentrations, and at three sites near freeways. No additional monitors were required for the SIP or Maintenance Plans because the Air District had not been designated as non-attainment for NO_2 and no SIP or maintenance plans were prepared for NO_2.

In 2010, the Air District operated 16 NO_2 monitors in the Bay Area (14 SLAMS sites plus two SPM sites) because NO_2 is a criteria pollutant and because NO_2 and NO are important precursors in ozone formation. NO and NO_2 are formed from vehicle, power plant and other industrial emissions, and contribute to the formation of fine particulate pollution and smog. Table 7 shows the minimum NO_2 monitoring requirements.

Table 7. Minimum Monitoring Requirements for NO_2 SLAMS Sites in 2013.

MSA	County	Population (2010)	Annual Design[a] Value (ppb) 2010	Daily Design[b] Value (ppb) 2010	Number of Area-wide Monitors Required / Number of Roadside Monitors Required	Number of Area-wide Monitors Active / Number of Roadside Monitors Active	Additional Area-wide Monitors Needed / Additional Roadside Monitors Needed
San Francisco-Oakland-Fremont	SF, San Mateo, Alameda, Marin, Contra Costa	4,335,391	16	62	1	8[c]	0
					2	0	2
San Jose-Sunnyvale-Santa Clara	Santa Clara, San Benito	1,836,911	14	52	1	1	0
					1	0	1
Santa Rosa-Petaluma	Sonoma	483,878	8	37	0	1	0
					0	0	0
Vallejo-Fairfield	Solano	413,344	9	41	0	1	0
					0	0	0
Napa	Napa	136,484	9	37	0	1	0
					0	0	0

[a] Annual design values are determined for each monitoring site by calculating the arithmetic average of all of the reported 1-hour values for the most current year. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the national NO_2 annual standard of 53 ppb meet the standard.

[b] Daily design values are calculated at each monitoring site by taking the 3-year mean (2008-2010) of the 8th highest daily maximum 1-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the national NO_2 1-hour standard of 100 ppb meet the standard.

[c] The Fremont station was closed on 10/31/10 and is not included in this total.

Minimum Monitoring Requirements for CO

40 CFR Part 58, Appendix D, Section 4.2 states that there are no minimum requirements for the number of CO monitoring sites. No additional monitors are required for SIP or Maintenance Plans. The Air District was re-designated attainment for the 8-hour average CO NAAQS in 1998. The Air District CO maintenance plan is contained within the California Air Resource Board document "2004 Revision to the California State Implementation Plan

for Carbon Monoxide." The maintenance plan does not specify the number of CO monitors needed. Generally, the Air District operates one CO monitor within each of the nine Bay Area counties plus additional CO monitors in large cities. Also, CO monitors provide additional calibration system quality control information at full stations. CO monitoring could take on future importance because EPA is expected to review the current CO NAAQS and may revise the NAAQS to be more stringent. The Air District currently operates 12 CO monitors in its SLAMs network.

Modifications Made to Network in 2010

This section discusses specific changes made to instrumentation at Air District air monitoring stations in 2010. A more complete discussion of all instrumentation operating at the air monitoring stations can be found later in this document.

Concord

The collocated $PM_{2.5}$ sampler was changed from a 1-in-12 day schedule to a 1-in-6 day schedule in April 2010. Although a 1-in-12 schedule is all that is required by regulation, the Air District plans to continue operating this sampler on a 1-in-6 day schedule indefinitely. Collocated samples are taken to obtain an estimate of the precision of the sampling measurement by comparing collocated samples with the samples from the primary $PM_{2.5}$ sampler.

Cupertino Monte Vista

The Air District began a one year ambient air monitoring study in Cupertino in September 2010. The air monitoring station is located in Monte Vista Park. Although the purpose of the study is primarily source-oriented exposure from the cement plant and the associated truck traffic, the Air District is also monitoring population exposure to criteria pollutants including ozone, NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$, toxics, metals, and mercury. An Air District meteorological system is also located in the park. The station will operate for a minimum of one year, after which, data will be reviewed and a determination made on how long the project will continue.

Cupertino Prado Vista

The Air District began operating a particulate sampler at Cupertino in October 2008 to determine if emissions from the nearby Lehigh Cement Plant and its associated diesel truck traffic could be producing elevated particulate concentrations in nearby neighborhoods. Monitoring ended in July 2010 when roof construction began at the site which required removing the particulate sampler. Because a new Cupertino site was opening at Monte Vista Park in September 2010, the site at Prado Vista was not reopened after the roof construction was completed.

Fremont

With approval from EPA, the Air District closed this station on October 31, 2010. Air quality levels in Fremont were similar to nearby stations and exceedances of the NAAQS were rare. Toxics monitoring by CARB at Fremont ended on July 19, 2010.

Hayward

The ozone monitor did not operate during 2010 due to a lengthy and major construction project nearby which limited site access and posed a safety hazard to staff. The monitor resumed operations on April 1, 2011.

Livermore

A gas chromatograph (GC) was added to the Livermore station on August 1, 2010 as part of the Photochemical Assessment Monitoring Station (PAMS) program. The GC measures 55

ozone precursor compounds on an hourly averaged basis. A list of the 55 compounds and a description of the PAMS program can be found in the PAMS section of this document.

Oakland West

The Air District began monitoring for ozone on December 13, 2010 to obtain additional pollutant data downwind of the Port of Oakland.

Photochemical Assessment Monitoring Stations (PAMS)

EPA is funding hourly VOC speciated hydrocarbon measurements at three sites in the Bay Area: Livermore, Patterson Pass, and San Ramon. The Air District is supplementing these measurements with NOx and meteorological measurements at the three sites. The Livermore site was fully operational on August 1, 2010. The hydrocarbon and NOx monitoring began at Patterson Pass on March 1, 2011 but meteorological sensors will not be installed until the summer of 2011. The San Ramon site is expected to be operational by late summer 2011. A full description of the PAMS program can be found in the PAMS section of this document.

Redwood City

The collocated $PM_{2.5}$ sampler was changed from a 1-in-12 day schedule to a 1-in-6 day schedule in April 2010. Although a 1-in-12 schedule is all that is required by regulation, the Air District plans to continue operating this sampler on a 1-in-6 day schedule indefinitely. Collocated samples are taken to obtain an estimate of the precision of the sampling measurement by comparing collocated samples with measurements from the primary FEM-BAM instrument.

San Francisco

The Air District discontinued monitoring ozone precursors CH_4/NMHC on September 30, 2010. Monitoring of these non-criteria pollutants was discontinued to allow better utilization of Air District resources as monitoring for the PAMS program was brought online.

San Pablo

The San Pablo monitoring site was closed in March 2009 due to heavy damage from a fire in the building. The site was completely rebuilt with new state of the art monitoring equipment and reopened in May 2010.

San Jose

On December 22, 2010, the Air District changed the PM_{10} filter-based monitor from a high-volume to a low-volume sampler. This was necessary because of NCore program requirements to report PM coarse ($PM_{10-2.5}$) from low-flow PM_{10} and $PM_{2.5}$ samplers. More information about the NCore program can be found in the NCore section of this document.

School Air Toxics Monitoring Program

The Air District operated a sampler and meteorological system at Stevens Creek Elementary School in Cupertino starting in June 2009. The program and the monitoring site were closed in August of 2010. During the project, samplers operated on 1-in-6 day schedule and were analyzed for hexavalent chromium. A description of this monitoring program can be found in the EPA School Air Toxics Monitoring Program section of this document.

Proposed Modifications to Network in 2011-2012

This section discusses proposed changes to be made to the instrumentation at Air District air monitoring stations in the next 18 months. A more complete discussion of instrumentation and programs operating at the air monitoring stations can be found later in this document.

Berkeley

The Air District began a three year ambient air monitoring study in Berkeley in December 2007. The site was closed on December 31, 2010. The purpose of the study was to determine the pollution impacts to local residents from vehicular traffic and industry along the Highway 80 corridor. Although the purpose was primarily source-oriented exposure from the highway and local industry emissions, the Air District also monitored for population exposure to criteria pollutants including ozone, NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$. Gaseous toxic compounds and metals were sampled on a 1-in-6 day schedule.

Concord

The Air District will discontinue monitoring ozone precursors CH_4 and NMHC on May 31, 2011. Monitoring of these non-criteria pollutants is being discontinued to allow better utilization of Air District resources as monitoring for the PAMS program is brought online. A description of the PAMS program can be found in the PAMS section of this document.

Cupertino Monte Vista

On April 1, 2011, the Air District began measuring ozone precursors CH_4 and NMHC at this site. The Air District intended to measure these compounds when the station opened in September 2010, but the instrumentation requires high pressure hydrogen gas cylinders which were not permitted by the Santa Clara County Fire Department. As an alternative to compressed gas cylinders, new laboratory grade equipment was procured by the Air District. The new equipment required modification of the monitoring trailer thus delaying the start of CH_4/NMHC monitoring until April 2011.

Lead Monitoring

On October 15, 2008, EPA strengthened the National Ambient Air Quality Standard (NAAQS) for lead by lowering the standard from 1.5 $\mu g/m^3$ (quarterly average) to 0.15 $\mu g/m^3$ (rolling 3-month average). On December 27, 2010 EPA published a new regulation for lead monitoring and included monitoring at NCore program sites. The new regulation also requires lead monitoring at airports having lead emissions of one ton per year or greater.

NCore Program Lead Monitoring

The Air District's NCore monitoring site was brought fully online at the San Jose monitoring location effective January 1, 2011. Lead monitoring at San Jose has been on a 1-in-6 day schedule since January 2008 and will continue on this schedule indefinitely. A detailed description of the NCore monitoring program can be found in the NCore section of this document.

Airport Lead Monitoring

Although no airports in the Bay Area exceed the one ton per year emission threshold, the regulation lists an additional requirement for the Air District to participate in a1-year EPA funded lead monitoring study at three airports: San Carlos, Palo Alto, and Reid-Hillview. The San Carlos airport will have a primary and a collocated sampler to verify the precision of the measurements. Samples will be taken on a 1-in-6 day schedule and on the same dates as lead samples from the San Jose NCore site.

The airports chosen for this study were selected because they are near heavily populated areas and service piston engine aircraft which still use leaded fuels. Leaded aviation gas used in piston-engine aircraft accounts for nearly 50% of the total lead emissions in the United States annually.

Airport lead monitoring is scheduled to begin in December 2011 and end after one year. However, monitoring will be extended if lead concentrations are greater than 50% of the 0.15 $\mu g/m^3$ NAAQS.

Livermore

The Air District replaced the filter-based $PM_{2.5}$ sampler at Livermore with a continuous FEM-BAM $PM_{2.5}$ sampler on March 1, 2011. The new sampler will allow real-time display of the data on the Air District webpage, and will allow hourly analysis of the data.

NO_2 Monitoring

On April 12, 2010 EPA revised the NAAQS for NO_2 by creating a one-hour standard of 100 ppb. The annual standard was left at 53 ppb. The new regulation also requires that NO_2 monitoring be performed at three sites within 50 meters of major roadways in the Bay Area by January 1, 2013. However, the Air District plans to start this monitoring program at a location immediately south of the Bay Bridge toll plaza in Oakland by January 1, 2012. The Air District may also monitor CO and particulates to obtain additional pollutant data near roadways. Meteorological data from a nearby Air District operated meteorological site will be available to assist in the analyses of the data.

Particulate Matter (PM_{10}) Sites

The Air District is considering replacing high-volume PM_{10} samplers with low-volume PM_{10} samplers at all stations in 2011. These samplers use less power and are more accurate than the current high-volume PM_{10} technology. This was done at San Jose in December 2010.

Photochemical Assessment Monitoring Stations (PAMS)

EPA is funding hourly VOC speciated hydrocarbon measurements at three sites in the Bay Area: Livermore, Patterson Pass, and San Ramon. The Livermore site began recording the hydrocarbon data in 2010 and the Patterson Pass site began on March 1, 2011. The San Ramon site is expected to be operational by late summer 2011. A full description of the PAMS program can be found in this document.

San Jose

The San Jose station was approved as an NCore program station by EPA in October 2009. The additional monitoring requirements were effective January 1, 2011. To meet NCore program requirements PM coarse ($PM_{10-2.5}$) will be determined every 3rd day. $PM_{10-2.5}$ will be calculated (not directly measured) as the difference between PM_{10} and $PM_{2.5}$ measurements. Therefore, in January 2011, PM_{10} sampling was changed from a 1-in-6 day schedule to a 1-in-3 day schedule year-round; and $PM_{2.5}$ sampling was changed from 1-in-6 day schedule to a 1-in-3 day schedule in summer and will continue to operate daily in winter. Also, NO_y monitoring began on January 1, 2011 to meet NCore requirements. More information about the NCore program can be found in the NCore section of this document.

SO_2 Monitoring

On June 22, 2010 EPA revised the monitoring requirements for SO_2 to include source impact monitoring near major SO_2 sources. Network changes to meet the new requirements must be in place by January 1, 2013. The Air District's air monitoring network already includes three SLAMS SO_2 monitoring sites at Richmond 7th St, San Pablo, and Martinez that meet the new source impact monitoring requirements, so no network modifications will be required.

South San Jose

As mentioned in the 2009 Annual Network Plan, the Air District may agree to operate a monitoring station near the Metcalf Energy Center power plant in South San Jose. This site may be established as part of an agreement between the City of San Jose and the Metcalf Energy Center, but no progress in the agreement has been made during the past year. The station would be located in a residential neighborhood one mile northwest of the power plant and would monitor ambient levels of pollutants emitted by the power plant. Those pollutants are PM_{10}, NO/NO_2, and CO. It is intended to be a long-term site. If the Air District takes over operation of the site, ozone may also be monitored as part of a special study for two years.

Vallejo

The Air District replaced the filter-based $PM_{2.5}$ sampler at Vallejo with a continuous FEM-BAM $PM_{2.5}$ sampler on March 1, 2011. The new sampler will allow real-time display of the data on the Air District webpage, and will allow hourly analysis of the data.

Removing a NAAQS Compliance Monitor

When the Air District proposes changes to the air monitoring network, the proposed changes are included in the annual Monitoring Network Plan. The annual Monitoring Network Plan is posted on the Air District web site for 30 days to allow public comment on the proposed changes to the network. After the public comment period, the Air District reviews and considers the comments before making a final decision. The Air District then submits the Plan and any comments received to the EPA Region 9 Regional Administrator.

Before shutting down a SLAMS (State or Local Air Monitoring Station) monitor, 40 CFR Part 58.14c requires that the Air District obtain the Regional Administrator's written approval. The Regional Administrator will normally approve the shutdown of a SLAMS monitor when any of the following situations apply:

1) Criteria pollutant monitors which have shown attainment of the national standards during the previous five years may be removed if the probability is less than 10% that the monitor will exceed 80% of NAAQS during the next three years, and if the monitor is not required by an attainment or maintenance plan.
2) CO, PM_{10}, SO_2, or NO_2 monitors may be removed if the monitor has shown consistently lower concentrations than another monitor for the same pollutant in the same county during the previous five years.
3) Criteria pollutant monitors that have not violated the national standards in the most recent five years may be removed if the State Implementation Plan (SIP) provides a method of representing the air quality in the applicable county.
4) $PM_{2.5}$ monitors may be removed when EPA determines that measurements are not comparable to the relevant NAAQS because of siting issues.
5) Criteria pollutant monitors which are located upwind of an urban area to characterize transport may be removed if the monitor has not recorded violations of the relevant NAAQS in the previous five years, and if the monitor is being replaced by another monitor that characterizes transport.
6) Criteria pollutant monitors not eligible for removal under any of the above criteria may be moved to a nearby location with the same scale of representation if logistical problems beyond the agency's control make it impossible to continue operation at its current site.

The closure of a SPM (Special Purpose Monitor) monitor does not require approval from EPA, but a change in the designation of a monitoring site from SLAMS to SPM requires approval of the Regional Administrator.

Data Submission Requirement

After all data review procedures are complete, the Air District submits monthly air quality and associated precision and accuracy reports to the EPA AQS database within 90 days of the end of every month. Every year, the Air District submits a letter to Region 9 certifying that the previous calendar years' data is complete and correct. The certification letter for 2010 data was submitted to EPA Region 9 on April 29, 2011.

Site Information Definitions

The next section describes each air quality station operated within the Bay Area Air Quality Management District. In 2010 there were 29 stations operating in the Air District: 26 long-term stations (24 SLAMS stations and two SPM stations), and three temporary stations. Long-term stations are generally operated for decades, while temporary stations are expected to operate for one to three years. The Fremont station was closed on October 31, 2010 with approval from EPA.

The station description includes siting information about the station and the individual monitors at the station. Monitors must be operated following EPA requirements found in 40 CFR Part 58. These regulations also specify monitor siting criteria. Table 8 below lists these siting criteria where applicable.

Table 8. Monitor Information and EPA Air Monitoring Siting Criteria.

Monitor Information	Definition of Terms
Monitoring Objective	The purpose for monitoring at that location. Choices include Highest Concentration, Population Oriented, Source Impact, General Background, and Regional Transport.
Spatial scale	The relative distance over which the air pollution measurements are representative. Choices are Micro, Middle, Neighborhood, Urban, and Regional scales.
Sampling method	*40 CFR Part 58 Appendix C, 2.0*: requires that the monitor used must be from EPA's current List of Designated Reference and Equivalent Methods.
PM filter analysis method	Describes whether the PM filters are analyzed in-house by the local agency or at an outside laboratory.
Start date	The date valid data collection began for that pollutant at that air monitoring station.
Operation schedule	Describes if the monitor is operated continuously or intermittently (as for PM).
Sampling season	Most monitors operate all year, but some monitors may only operate during months when pollution potential is highest, e.g. ozone.
Distance to road from gaseous probe	*40 CFR Part 58 Appendix E, 6.0*: requires that monitors be located far enough from roadways to minimize local mobile impacts on measurements. Recommended distances are found in Table E-1 for NO_x and ozone, Table E-2 for CO, and Figure E-1 for PM.
Ground cover	*40 CFR Part 58 Appendix E, 3.0*: states that particulate samplers should not be located in an unpaved area unless there is vegetative ground cover year round, so that the impact of wind blown dusts will be kept to a minimum.
Probe height (AGL)	*40 CFR Part 58 Appendix E, 2.0*: requires that probe height be 2-15 meters above ground level (AGL).
Probe height above roof	*40 CFR Part 58 Appendix E, 2.0*: requires the probe be at least 1 meter vertically or horizontally away from any supporting structure.
Distance from obstructions on roof	*40 CFR Part 58 Appendix E, 4.0*: requires that the distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe or inlet. PM samplers must have a 2 meter separation from walls, parapets and structures. 4.0 (b)

Table 8 continued. Monitor Information and EPA Air Monitoring Siting Criteria.

Monitor Information	Definition of Terms
Distance from obstructions not on roof	*40 CFR Part 58 Appendix E, 4.0*: requires that the distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe or inlet.
Distance from tree (DL)	*40 CFR Part 58 Appendix E, 5.0*: requires that probe be at least 10 meters from the nearest tree drip line.
Distance to furnace or incinerator flue	*40 CFR Part 58 Appendix E, 3.0*: requires that scavenging be minimized by keeping the probe away from furnace or incineration flues or other minor sources of SO_2 or NO. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel.
Distance between collocated monitors	*40 CFR Part 58 appendix A, 3.2.5.6*: requires that PM monitors be 2-4 meters apart for flow rates >200L/m and have a 1-4 meter separation for flow rates <200 L/m.
Unrestricted airflow	*40 CFR Part 58 Appendix E, 4.0*: requires the probe or inlet to have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential.
Probe material	*40 CFR Part 58, Appendix E, 9.0*: requires that either Pyrex glass or FEP Teflon be used for intake sampling lines.
Residence time	*40 CFR Part 58, Appendix E, 9.0*: recommends a residence time of 20 seconds or less for gaseous sampling.
Will there be changes within the next 18 mos?	Describes if any changes are expected to occur to that monitor at that station within the next 18 months.
Is it suitable for comparison against the annual $PM_{2.5}$?	*40 CFR 58.30*: requires that $PM_{2.5}$ data that are representative, not of area-wide, but rather of relatively unique population-oriented micro-scale, localized hot spot, or unique population-oriented middle-scale impact sites are only eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS.
Frequency of flow rate verification for manual PM samplers	*40 CFR 58, Appendix A, 3.3.2*: requires that a one-point flow rate verification check must be performed at least once every month for low-volume PM samplers and quarterly for hi-volume PM samplers.
Frequency of flow rate verification for automated PM analyzers	*40 CFR 58, Appendix A 3.2.3*: requires a one-point flow rate verification check must be performed at least once every month.
Frequency of one-point QC check (gaseous)	*40 CFR Part 58 Appendix A, 3.2.1*: requires that QC checks be performed at least once every two weeks.
Last Annual Performance Evaluation (gaseous)	*40 CFR Part 58 Appendix A, 3.2.2*: requires that SO_2, CO, O_3, and NO_2 monitors have annual performance evaluations. Section 3.2.7 requires that performance evaluations of PM monitors must be performed annually through the PEP (Performance Evaluation Program).
Last two semi-annual flow rate audits for PM monitors	*40 CFR Part 58 Appendix A, 3.2.4 (automated methods) and 3.3.3 (manual methods)*: require that PM samplers have flow rate checks every six months.

Included in each site description is the number of days when a criteria pollutant measurement exceeded the National Ambient Air Quality Standard (NAAQS). The national standards for hourly and daily averaging times are shown in Table 9 below. Based on the past ten years of air monitoring data, only ozone and $PM_{2.5}$ are pollutants of interest to Bay Area residents because the other pollutants rarely, if ever, exceed the NAAQS. The table below is abbreviated for clarity. A full list of national and California air quality standards can be found at: http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm

Table 9. National Ambient Air Quality Standards (as of December 31, 2010)

Pollutant	Averaging Time	Standard
Ozone	8 hour	0.075 ppm
PM2.5	24 hour	35 $\mu g/m^3$
PM10	24 hour	150 $\mu g/m^3$
Carbon Monoxide	1 hour	35 ppm
	8 hour	9 ppm
Sulfur Dioxide	1 hour	75 ppb
Nitrogen Dioxide	1 hour	100 ppb

Detailed Site Information for SLAMS Stations

Bethel Island

Site Name	Bethel Island
AQS ID	06-013-1002
GIS coordinates	38.0063° N, 121.6419° W
Location	Trailer in parking lot
Address	5551 Bethel Island Rd, Bethel Island CA 94511
County	Contra Costa
Distance to road from gaseous probe	Bethel Island Rd: 63 meters Sandmound Blvd: 110 meters
Traffic count	Bethel Island Rd: 5,550 ADT (2009) Sandmound Blvd: 1,537 ADT (2006)
Groundcover	Gravel surrounded by grassy fields
Representative Area	San Francisco-Oakland-Fremont MSA

Bethel Island was chosen for an air monitoring site to measure pollutant transport between the California Central Valley and the San Francisco Bay Area. The site is 26 miles east of the only sea-level gap (the Carquinez Strait) between the two regions. Local pollution emissions are low due to the rural nature of the area and the lack of any industrial sources within six miles of the site. The nearest town is Bethel Island, 0.6 miles to the north, with a population of 2,137 according to the 2010 census. The Bethel Island station was operated by CARB from 1981 until late 1986 and then it was transferred to the Air District.

Ozone and NO_2 are measured because the area is in the transport corridor between the San Francisco Bay Area and the Central Valley, both of which are major sources of ozone, ozone precursors, and particulates. Traffic volume near the site is low, so CO measurements tend to be representative of natural background levels, or regional transport. SO_2 is measured because the area is downwind from numerous refineries, which can be large sources of SO_2. PM_{10} is measured because easterly winds occasionally transport particulates from the Central Valley, and because the filters can be analyzed to determine sulfate and nitrate levels transported from the Central Valley.

Background levels of toxic compounds are also determined from canister samples taken at Bethel Island on a 1-in-12 day schedule and later analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, the national 8-hour ozone standard was exceeded 11 times at this site. No exceedances of the national standards for PM_{10}, NO_2, SO_2 (the new 75 ppb 1-hour standard) or CO were measured during the last three years.

Bethel Island Monitor Information

Pollutant	O3	CO	NO/NO2	SO2	PM10
Monitoring Objective	Regional Transport & Highest Conc.	General Background	Regional Transport	Regional Transport	Regional Transport
Spatial scale	Regional	Regional	Regional	Regional	Regional
Sampling method	TECO 49i	TECO 48i	TECO 42C	TECO 43C	Andersen GUV-16HBLA
PM filter analysis method	N/A	N/A	N/A	N/A	Weighed by Air District
Start date	01/01/87*	01/01/87*	01/01/87*	01/01/87*	11/05/86
Operation schedule	Continuous	Continuous	Continuous	Continuous	1-in-6
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	6.7 m	6.7 m	6.7 m	6.7 m	5.2 m
Probe height above roof	3.0 m	3.0 m	3.0 m	3.0 m	1.5 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	None	None	None	None	None
Distance from tree (DL)	13.3 m	13.3 m	13.3 m	13.3 m	14.4 m
Distance to furnace or incinerator flue	None	None	None	None	None
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	270°	270°	270°	270°	270°
Probe material	Teflon	Teflon	Teflon	Teflon	N/A
Residence time	13 s	14 s	14 s	14 s	N/A
Will there be changes within the next 18 mos?	No	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A	Weekly
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day	N/A
Last Annual Performance Evaluation (gaseous)	11/09/10	11/09/10	11/09/10	11/09/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	11/08/10 05/24/10

* Start date of data collected by the Air District. Data was collected by CARB began on March 1, 1981.

Concord

Site Name	Concord
AQS ID	06-013-0002
GIS coordinates	37.9360° N, 122.0262° W
Location	One story commercial building
Address	2956-A Treat Blvd, Concord CA 94518
County	Contra Costa
Distance to road from gaseous probe	Treat Blvd: 181 meters Oak Grove Rd: 244 meters
Traffic count	Treat Blvd: 41,218 ADT (2005) Oak Grove Rd: 26,742 ADT (2005) Interstate 680 242,000 ADT (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Concord was chosen for an air monitoring site because it is the largest city in Contra Costa County, with a 2010 population of 122,067 according to the 2010 census; and because of the high pollution potential due to locally emitted and transported pollutants into the area. Since Concord is located in the Diablo Valley, locally emitted pollutants can become trapped when winds are light. Large emission sources in the valley include the two major freeways, Interstate 680 and California Highway 4; and two refineries at the north end of the valley.

The air monitoring site is located in the back of a shopping center, near the intersection of two major streets, and surrounded by residential neighborhoods. There is no industry in the immediate vicinity. NO/NO_2 and CH_4/NMHC are measured because of local mobile emissions. Monitoring of CH_4/NMHC was discontinued on May 31, 2011 because of the development of PAMS network (described elsewhere in this report), which is a more effective allocation of resources. The PAMS network better defines the measurement and sources of ozone precursors, making additional measurements of CH_4/NMHC at Concord superfluous.

Ozone is measured at the site because hot, inland summertime temperatures combined with precursor pollutants stagnating in the surrounding valley often produces high ozone levels. Carbon monoxide is measured because the site is near two major roads, Treat Blvd and Oak Grove Road. SO_2 is measured because the site is six miles south of the Tesoro and the Shell Refineries, both potential major sources of SO_2. PM_{10} and $PM_{2.5}$ are measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels in the valley.

The collocated $PM_{2.5}$ sampler operated on a 1-in-12 day schedule in January, February, and March of 2010. However, to obtain additional data for comparison with the primary $PM_{2.5}$ sampler, the Air District starting operating the collocated sampler on a 1-in-6 day schedule starting in April 2010. The Air District intends to continue operating the collocated sampler on a 1-in-6 day schedule indefinitely.

VOC toxic compounds are also sampled at Concord on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded nine exceedances of the national 8-hour ozone standard, and five exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for $PM_{10,}$ $NO_{2,}$ SO_2 (the new 75 ppb 1-hour standard) or CO were measured during the last three years.

Concord Monitor Information

Pollutant	**O3**	**CO**	**NO/NO2**	**SO2**	**CH4/NMHC**
Monitoring Objective	Population oriented & Highest Conc.	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Urban	Neighborhood
Sampling method	TECO 49i	TECO 48A	TECO 42C	TECO 43C	TECO 55C
PM filter analysis method	N/A	N/A	N/A	N/A	N/A
Data Start date	04/08/80	02/21/80	NO2: 01/01/80 NO: 03/01/80	02/01/80	CH4:12/31/99 NMHC:05/10/06
Operation schedule	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	9.2 m	9.2 m	9.2 m	9.2 m	9.2 m
Probe height above roof	3.1 m	3.1 m	3.1 m	3.1 m	3.1 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	None	None	None	None	None
Distance from tree (DL)	24.0 m	24.0 m	24.0 m	24.0 m	24.0 m
Distance to furnace or incinerator flue	None	None	None	None	None
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon	Teflon
Residence time	8 s	9 s	9 s	10 s	8 s
Will there be changes within the next 18 mos?	No	No	No	No	Yes
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	08/26/10	08/26/10	08/26/10	08/26/10	08/26/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	N/A

Concord Monitor Information

Pollutant	PM10	FRM PM2.5	FRM PM2.5 Collocated
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Sampling method	Andersen HiVol 1200	Partisol-Plus 2025 w/VSCC	Partisol-Plus 2025 w/VSCC
PM filter analysis method	Weighed by Air District	Weighed by Air District	Weighed by Air District
Data Start date	11/04/86	03/19/99	03/19/99
Operation schedule	1-in-6	Apr-Sep: 1-in-3 Oct-Mar: daily	Jan-Mar: 1-in-12 Apr-Dec: 1-in-6
Sampling season	All year	All year	All year
Probe height (AGL)	5.8 m	5.9 m	5.9 m
Probe height above roof	1.5 m	2 m	2 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	15.0 m	13.1 m	17.4 m
Distance to furnace or incinerator flue	None	None	None
Distance between collocated monitors	N/A	3.2 m	3.2 m
Distance between PM10 and PM2.5 monitors	7.5 m	7.5 m	3.2 m
Unrestricted airflow	360°	360°	360°
Probe material	N/A	N/A	N/A
Residence time	N/A	N/A	N/A
Will there be changes within the next 18 mos?	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	Yes	Yes
Frequency of flow rate verification for manual PM samplers	Weekly	Monthly	Monthly
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	N/A	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	11/15/10 05/19/10	11/15/10 05/19/10	11/15/10 05/19/10

Fairfield

Site Name	Fairfield
AQS ID	06-095-0005
GIS coordinates	38.2270° N, 122.0756° W
Location	Small trailer in open field
Address	1010 Chadbourne Rd, Fairfield CA 94534
County	Solano
Distance to road from gaseous probe	Cordelia Rd: 194 meters Chadbourne Rd: 705 meters
Traffic count	Cordelia Rd: 3,751 ADT (2007) Chadbourne Rd: 500 ADT (2007)
Groundcover	Vegetative
Representative Area	Vallejo-Fairfield MSA

Fairfield was chosen for monitoring ozone transport between the San Francisco Bay Area and the Sacramento Valley. Fairfield lies in the northeast part of the Air District in the Carquinez Strait Region, the only sea level gap between the Bay Area and the Central Valley. Prevailing westerly winds carry ozone and its precursors into the Sacramento Valley from the Bay Area. Occasionally, easterly winds transport elevated ozone levels into this region from the Central Valley.

Over the past decade the Fairfield/Suisun City urban area has grown considerably. According to the 2010 census the area has a combined population of 138,815, the largest urban area in Solano County. As a result, Fairfield is also a population oriented ozone monitoring site. The monitoring site is located in a rural area, situated between the nearby urban area of Fairfield/Suisun City urban area, and the greater Bay Area. Prevailing winds are west, and the monitor normally measures ozone concentrations coming from the Bay Area.

Ozone concentrations measured at Fairfield exceeded the national 8-hour ozone standard on five days during the last three years.

Fairfield Monitor Information

Pollutant	**O3**
Monitoring Objective	Regional transport & Population oriented
Spatial scale	Regional
Sampling method	TECO 49C
Analysis method	N/A
Start date	05/29/02
Operation schedule	Continuous
Sampling season	Apr 1-Nov 30
Probe height (AGL)	3.7 m
Probe height above roof	1.0 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	>50 m
Distance to furnace or incinerator flue	None
Unrestricted airflow	360°
Probe material	Teflon
Residence time	5 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every other day
Last Annual Performance Evaluation (gaseous)	11/8/10
Last two semi-annual flow rate audits for PM monitors	N/A

Fremont

Site Name	Fremont
AQS ID	06-001-1001
GIS coordinates	37.5358° N, 121.9618° W
Location	One story commercial building
Address	40733 Chapel Way, Fremont CA 94538
County	Alameda
Distance to road from gaseous probe	Fremont Boulevard: 120.0 meters Chapel Way: 31.0 meters
Traffic count	Fremont Boulevard: 33,390 ADT (2008) Chapel Way: 500 ADT (estimate)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

The Fremont air monitoring station was closed on October 31, 2010. Fremont was an important air monitoring location in the past. Ozone, CO, NO/NO_2, CH_4/NMHC and $PM_{2.5}$ have been monitored at this site. In the most recent decade, air quality levels and the number of exceedances of the NAAQS at Fremont have shown a high correlation to nearby sites. This indicates that air quality levels in Fremont are adequately characterized by measurements at sites such as Hayward and San Jose. The Air District completed an assessment of the Air Monitoring Network in July 2010, and the analysis concluded that air quality measurements at the Fremont station had a comparatively low importance rating. The closure of the Fremont station allows more effective utilization of limited resources in the face of additional monitoring requirements mandated by EPA.

VOC toxic compounds, carbonyls, and metals were sampled at Fremont on a 1-in-12 day schedule and analyzed by the CARB laboratory. CARB discontinued its toxic monitoring program at Fremont on July 19, 2010. More information about the CARB toxics monitoring program can be found at http://www.arb.ca.gov/toxics/toxics.htm. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

During the most recent three years, the national 8-hour ozone standard was exceeded twice and the national 24-hour $PM_{2.5}$ standard was exceeded once at this site. No exceedances of the national NO_2 or CO standards were measured during the last three years.

Fremont Monitor Information*

Pollutant	O3	CO	NO/NO2	CH4/NMHC
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 48A	TECO 42C	TECO 55C
PM filter analysis method	N/A	N/A	N/A	N/A
Start date	07/29/76	01/01/71	NO: 07/01/76 NO2: 04/12/74	CH4: 01/01/94 NMHC: 05/25/06
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	8.4 m	8.4 m	8.4 m	8.4 m
Probe height above roof	4.3 m	4.3 m	4.3 m	4.3 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	25.9 m	25.9 m	25.9 m	25.9 m
Distance to furnace or incinerator flue	3.7 m	3.7 m	3.7 m	3.7 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon
Residence time	13 s	14 s	12 s	13 s
Will there be changes within the next 18 mos?	Site closed	Site closed	Site closed	Site closed
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	10/29/10	10/29/10	10/29/10	07/23/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A

*All Fremont monitors closed on October 31, 2010 (except CH4/NMHC closed July 31, 2010)

Fremont Monitor Information*

Pollutant	**Continuous PM2.5 FEM BAM**
Monitoring Objective	Population oriented
Spatial scale	Neighborhood
Sampling method	Met One BAM FEM 1020
PM filter analysis method	N/A
Start date	10/01/09
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	6.2 m
Probe height above roof	2.1 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	28.9 m
Distance to furnace or incinerator flue	4.1 m
Distance between collocated monitors	N/A
Unrestricted airflow	360°
Probe material	N/A
Residence time	N/A
Will there be changes within the next 18 mos?	Site closed
Is it suitable for comparison against the annual PM2.5?	Yes
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Every two weeks
Frequency of one-point QC check (gaseous)	N/A
Last Annual Performance Evaluation (gaseous)	N/A
Last two semi-annual flow rate audits for PM monitors	10/29/10 06/02/10

*All Fremont monitors closed on October 31, 2010 (except CH4/NMHC closed July 31, 2010)

Gilroy

Site Name	Gilroy
AQS ID	06-085-0002
GIS coordinates	36.9993° N 121.5749° W
Location	Air monitoring shelter next to water pump station
Address	9th and Princevalle St, Gilroy CA 95020
County	Santa Clara
Distance to road from gaseous probe	Princevalle St: 18.3 meters 9th St: 15.7 meters 10th St. 185.0 meters
Traffic count	Princevalle St: 5,000 ADT (2008) 9th St: 1,400 ADT (estimate) 10th St. 12,700 ADT (2008)
Groundcover	paved
Representative Area	San Jose-Sunnyvale-Santa Clara MSA

Gilroy was originally chosen as an air monitoring site to measure ozone and particulate transport between the San Francisco and Monterey Bay Areas. Prevailing northwesterly afternoon winds carry ozone and ozone precursors from the San Jose area southward through the Santa Clara Valley. When temperatures are hot, and solar insolation is strong, these precursors react and can form high concentrations of ozone in the Gilroy area. As Gilroy grew in population (48,821 according to the 2010 census) the site was considered not only an ozone transport site but also a population oriented ozone site. $PM_{2.5}$ is measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels in the valley.

The monitoring site is located in a residential area of Gilroy on the west side of the Santa Clara Valley. Air quality studies have shown that the west side of the valley has higher ozone levels than the east side. This is due to elevated terrain on the west side that shelters the western part of Gilroy from the strong winds in the afternoon produced by the Monterey Bay sea breeze. Residents have preferred the sheltered area and built most of the town on the west side of the valley.

In the most recent three years, the national 8-hour ozone standard was exceeded seven times at this site. The national 24-hour $PM_{2.5}$ standard was exceeded once during the last three years and it was due to smoke from a wildfire on August 14, 2009.

Gilroy Monitor Information

Pollutant	O3	Continuous PM2.5 FEM BAM
Monitoring Objective	Regional Transport, Highest Concentration, Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood
Sampling method	TECO 49C	Met One BAM 1020
PM filter analysis method	N/A	N/A
Data Start date	07/01/80	10/31/09
Operation schedule	Continuous	Continuous
Sampling season	Apr 1 – Nov 30	All year
Probe height (AGL)	4.7 m	2.9 m
Probe height above roof	2.6 m	N/A
Distance from obstructions on roof	None	N/A
Distance from obstructions not on roof	None	1.8 m
Distance from tree (DL)	26 m	26 m
Distance to furnace or incinerator flue	14.3 m	14.3 m
Distance between collocated monitors	N/A	N/A
Unrestricted airflow	360º	360°
Probe material	Teflon	N/A
Residence time	13 s	N/A
Will there be changes within the next 18 mos?	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	Yes
Frequency of flow rate verification for manual PM samplers	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	Every other day	N/A
Last Annual Performance Evaluation (gaseous)	11/09/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	07/26/10 04/13/10

Hayward

Site Name	Hayward
AQS ID	06-001-2001
GIS coordinates	37.6545° N, 122.0315° W
Location	Pump house near water tank
Address	3466 La Mesa Drive, Hayward CA 94542
County	Alameda
Distance to road from gaseous probe	Hayward Blvd: 26.2 meters La Mesa Dr: 38 meters
Traffic count	Hayward Blvd: 4,400 ADT (2007) La Mesa Dr: 500 ADT (estimate)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

The Hayward air monitoring site was chosen to measure ozone at a higher elevation. Located on the east side of Hayward at an elevation of 951 feet, it is the highest elevation air monitoring site in the Air District. Studies had shown that on high ozone days, a cloud of ozone and precursors moves southward from Oakland on the west side of the East Bay Hills.

Because ozone monitoring sites were already in place in the low-lying areas of the East Bay and South Bay, i.e. in Oakland and San Jose, this site was chosen to be between them, but at a higher elevation. Thus, the site gives an indication of ozone levels aloft. The Hayward site is also important because it provides air quality forecasting information concerning residual ozone from the previous day. Although there is a large water tank onsite in the upwind direction, the instrument probe is high enough to avoid the tank being an obstacle. The scale of this site is considered to be regional because it is representative of ozone levels aloft.

The Hayward site was shut down on November 6, 2009 due to the demolition and reconstruction of the water tank nearby the site. The construction project was completed in late 2010 and the site reopened at the start of the ozone sampling season on April 1, 2011.

Prior to the temporary shutdown of Hayward in 2010, during the three most recent years of operation of the site (2007-2009), the national 8-hour ozone standard was exceeded four times.

Hayward Monitor Information

Pollutant	**O3**
Monitoring Objective	Population oriented & Regional Transport
Spatial scale	Regional
Sampling method	TECO 49i
PM filter analysis method	N/A
Start date	05/31/77
Operation schedule	Continuous
Sampling season	April 1-November 30
Probe height (AGL)	6.7 m
Probe height above roof	3.1 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	11.4 m
Distance to furnace or incinerator flue	N/A
Distance between collocated monitors	N/A
Unrestricted airflow	360°
Probe material	Teflon
Residence time	15 s
Will there be changes within the next 18 months?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every other day
Last Annual Performance Evaluation (gaseous)	11/03/09*
Last two semi-annual flow rate audits for PM monitors	N/A

*The Hayward site was not in operation during 2010.

Livermore

Site Name	Livermore
AQS ID	06-001-0007
GIS coordinates	37.6875° N, 121.7842° W
Location	One story commercial building
Address	793 Rincon Avenue, Livermore CA 94551
County	Alameda
Distance to road from gaseous probe	Rincon Ave: 67 meters Pine St: 94 meters Interstate 580: 1,400 meters
Traffic count	Rincon Ave: 2,400 ADT (2005) Pine St: 4,800 ADT (2005) Interstate 580 at Portola Ave: 166,000 ADT (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Livermore was chosen for an air monitoring site because it is the largest city in eastern Alameda County, with a 2010 population of 80,968 according to the 2010 census, and because measurements have shown this area can have the highest ozone levels in the Bay Area. Livermore is located within the Livermore Valley, an east-west oriented inland valley between the San Francisco Bay and the Central Valley. Air flow analyses on high ozone days have shown ozone precursors to move into this valley from the region surrounding the San Francisco Bay through the Hayward and Niles Canyon Gaps to the west, and from the San Ramon Valley to the north.

The air monitoring site is situated west of the city center, in a residential neighborhood. The station is located in a small one-story shopping center, with a little-used parking lot in front of the station and a city park behind it. There are no industrial sources in the immediate vicinity. Ozone and its precursors, CH_4/NMHC and NO/NO_2, are measured because the area is downwind of large sources of ozone precursors. $PM_{2.5}$ is measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels.

Continuous $PM_{2.5}$ (BAM) monitoring was discontinued after September 7, 2010 because the Air District was preparing to install and test a continuous $PM_{2.5}$ FEM-BAM monitor. Testing was completed in late 2010 and both the new $PM_{2.5}$ FEM-BAM and the existing $PM_{2.5}$ FRM operated daily from January 1, 2011 through February 28, 2011. On March 1, 2011 the continuous FEM-BAM monitor replaced the FRM monitor and the FRM monitor was removed.

VOC toxic compounds are also sampled at Livermore on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

The Livermore site is part of a Bay Area Photochemical Assessment Monitoring Stations (PAMS) program. This is a program to measure hourly speciated hydrocarbons using a gas chromatograph analyzer at three Bay Area locations. The other two locations are San Ramon and Patterson Pass. A full description of the PAMS program can be found in this document.

During the most recent three years, this site recorded 15 exceedances of the national 8-hour ozone standard, and six exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national NO_2 standard were measured during the last three years.

Livermore Monitor Information

Pollutant	O3	NO/NO2	CH4/NMHC
Monitoring Objective	Population oriented & Highest Conc.	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 42C	TECO 55C
PM filter analysis method	N/A	N/A	N/A
Data Start date	01/01/00	NO2:12/31/99 NO: 01/01/00	CH4: 12/31/99 NMHC:04/20/05
Operation schedule	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year
Probe height (AGL)	6.1 m	6.1 m	6.1 m
Probe height above roof	3.3 m	3.3 m	3.3 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	51 m	51 m	51 m
Distance to furnace or incinerator flue	16.5 m	16.5 m	16.5 m
Distance between collocated monitors	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°
Probe material	Teflon	Teflon	Teflon
Residence time	11 s	12 s	10 s
Will there be changes within the next 18 months?	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	08/14/10	08/14/10	08/14/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A

Livermore Monitor Information

Pollutant	FRM PM2.5	Continuous PM2.5 BAM	Speciated PM2.5
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Sampling method	Partisol-Plus 2025 w/VSCC	Met One BAM 1020	Met One SASS
PM filter analysis method	Weighed by Air District	N/A	Weighed by DRI
Data Start date	12/02/99	07/01/00	06/11/08
Operation schedule	Apr-Sep 1-in-6 Oct-Mar: daily	Continuous	1-in-6
Sampling season	All year	All year	All year
Probe height (AGL)	5.4 m	5.1 m	5.1 m
Probe height above roof	2.3 m	2.0 m	2.0 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	53 m	52 m	55 m
Distance to furnace or incinerator flue	16 m	21 m	17 m
Distance between collocated monitors	N/A	N/A	N/A
Distance between PM10 and PM2.5 monitors	PM2.5 to SASS: 2.7 m PM2.5 to BAM: 5.2 m	BAM to PM2.5: 5.2 m BAM to SASS: 3.5 m	SASS to BAM: 3.5 m SASS to PM2.5: 2.7 m
Unrestricted airflow	360°	360°	360°
Probe material	N/A	N/A	N/A
Residence time	N/A	N/A	N/A
Will there be changes w/in the next 18 mos?	No	No	No
Is it suitable for comparison against the annual PM2.5?	Yes	No – not reference or equivalent method	No
Frequency of flow rate verification for manual PM samplers	Monthly	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks	N/A
Frequency of one-point QC check (gaseous)	N/A	N/A	N/A
Last Annual Perform. Evaluation (gaseous)	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	08/03/10 04/22/10	08/03/10 04/22/10	08/03/10 04/22/10

Los Gatos

Site Name	Los Gatos
AQS ID	06-085-1001
GIS coordinates	37.2269° N 121.9798° W
Location	Top of fire station's hose drying tower
Address	306 University Ave, Los Gatos CA 95030
County	Santa Clara
Distance to road From gaseous probe	University Ave: 37.2 meters Bentley Ave: 26.5 meters State Route 17: 291 meters
Traffic count	University Ave: 13,600 ADT (2005) Bentley Ave: 400 ADT (estimate) State Route 17: 62,000 ADT (2008)
Groundcover	Paved
Representative Area	San Jose- Sunnyvale- Redwood City MSA

Los Gatos was chosen for an ozone monitoring site because prevailing northerly winds transport ozone and ozone precursors from the densely populated area around the south Bay Area to the west side of the Santa Clara Valley. Mobile sampling studies as well as long-term monitoring in the Saratoga and Los Gatos areas showed Los Gatos to have the highest ozone levels in the area.

High ozone levels are in part due to Los Gatos being situated at the base of the Santa Cruz Mountains, which act as a barrier to the movement of polluted air. The monitoring site is located near the downtown area at a fire station surrounded by residential neighborhoods. The city of Los Gatos has a 2010 population of 29,413 according to the 2010 census.

In the most recent three years, this site recorded eight exceedances of the national 8-hour ozone standard.

Los Gatos Monitor Information

Pollutant	**O3**
Monitoring Objective	Population oriented & Highest concentration
Spatial scale	Neighborhood
Sampling method	TECO 49i
PM filter analysis method	N/A
Data Start date	04/01/72
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	11.0 m
Probe height above roof	3.2 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	15.5 m
Distance to furnace or incinerator flue	4.3 m
Distance between collocated monitors	N/A
Unrestricted airflow	360º
Probe material	Teflon
Residence time	11 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every other day
Last Annual Performance Evaluation (gaseous)	07/27/10
Last two semi-annual flow rate audits for PM monitors	N/A

Martinez

Site Name	Martinez
AQS ID	06-013-2001
GIS coordinates	38.0128° N, 122.1345° W
Location	Small sampling shelter next to fire station
Address	521 Jones St, Martinez CA 94553
County	Contra Costa
Distance to road from gaseous probe	Jones St: 22 meters Alhambra Ave: 19 meters
Traffic count	Jones St: 2,000 ADT (2008) Alhambra Ave: 9,800 ADT (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Martinez was chosen for SO_2 source impact monitoring because the Shell Oil Refinery is located on the northern and eastern borders of the city. The Tesoro Refinery is also nearby, 2.5 miles to the east. Although the prevailing winds in the area are from the west, east winds can transport SO_2 emissions from the refineries over populated areas within the city.

The monitoring site is located near downtown Martinez and 0.5 miles from the Shell Refinery property. According to the 2010 census, Martinez has a 2010 population of 35,824. There are no industrial activities or SO_2 sources nearby other than the refineries.

VOC toxic compounds are also sampled at Martinez on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

SO_2 concentrations measured at Martinez did not exceed the national 1-hour 75-ppb standard during the last three years.

Martinez Monitor Information

Pollutant	SO2
Monitoring Objective	Source Impact
Spatial scale	Neighborhood
Sampling method	TECO 43C
Analysis method	N/A
Start date	07/02/73
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	7.2 m
Probe height above roof	2.7 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	11.2 m
Distance to furnace or incinerator flue	None
Unrestricted airflow	360°
Probe material	Teflon
Residence time	13 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every other Day
Last Annual Performance Evaluation (gaseous)	9/15/10
Last two semi-annual flow rate audits for PM monitors	N/A

Napa

Site Name	Napa
AQS ID	06-055-0003
GIS coordinates	38.3110° N, 122.2962° W
Location	One story commercial building
Address	2552 Jefferson St, Napa CA 94558
County	Napa
Distance to road from gaseous probe	Jefferson St: 15 meters
Traffic count	Jefferson St: 19,143 ADT (2007)
Groundcover	Paved
Representative Area	Napa MSA

Napa was chosen for an air monitoring location because it is the largest city in Napa County with a 2010 population of 76,915 according to the 2010 census. The city is located in the center of Napa Valley where agricultural burning and fireplace usage during the fall and winter can result in high particulate levels. In summer months, Napa can have elevated ozone levels when central Bay Area ozone precursors are transported northward into the valley.

The air monitoring site is situated about a mile north of downtown Napa in a mixed residential and commercial neighborhood. There are no industrial sources in the immediate vicinity. Ozone and NO/NO_2 are measured because southerly winds carry ozone and its precursors into Napa. Carbon monoxide is measured because the Napa Valley is a major tourist attraction with resulting high traffic volumes through the city. PM_{10} and continuous $PM_{2.5}$ are measured because of agricultural and household wood burning.

VOC toxic compounds are also sampled at Napa on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded five exceedances of the national 8-hour ozone standard. No exceedances of the national standards for PM_{10}, NO_2 or CO were measured during the last three years. The continuous $PM_{2.5}$ (BAM) monitor has recorded measurements above the national 24-hour $PM_{2.5}$ standard on nine days during the most recent three years and six of those days were during the northern California wildfire outbreak in the summer of 2008. This monitor is not a recognized FRM or FEM method, and the data cannot be used to determine violations of the national $PM_{2.5}$ standards, or its attainment status. Only FRM or FEM based $PM_{2.5}$ measurements may be used for comparison with national $PM_{2.5}$ standards.

Napa Monitor Information

Pollutant	O3	CO	NO/NO2
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Middle	Middle	Middle
Sampling method	TECO 49i	TECO 48i	TECO 42C
PM filter analysis method	N/A	N/A	N/A
Start date	07/01/76	07/01/73	07/01/73
Operation schedule	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year
Probe height (AGL)	8.9 m	8.9 m	8.9 m
Probe height above roof	5.2 m	5.2 m	5.2 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	25 m	25 m	25 m
Distance to furnace or incinerator flue	5.7 m	5.7 m	5.7 m
Distance between collocated monitors	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°
Probe material	Teflon	Teflon	Teflon
Residence time	8 s	8 s	9 s
Will there be changes within the next 18 mos?	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	09/07/10	09/07/10	09/07/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A

Napa Monitor Information

Pollutant	PM10	PM10 Collocated	Continuous PM2.5 BAM
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Middle	Middle	Middle
Sampling method	Tisch Env. HiVol TE-6000	Tisch Env. HiVol TE-6000	Met One BAM 1020
PM filter analysis method	Weighed by Air District	Weighed by Air District	N/A
Start date	11/04/86	06/08/04	01/04/07
Operation schedule	1-in-6	1-in-6	Continuous
Sampling season	All year	All year	All year
Probe height (AGL)	5.5 m	5.3 m	5.5 m
Probe height above roof	1.8 m	1.8 m	1.8 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	21 m	20.7 m	26 m
Distance to furnace or incinerator flue	5.0 m	3.4m	8.8 m
Distance between collocated monitors	3.4 m	3.4m	N/A
Distance between PM10 and PM2.5 monitors	6.1 m	8.8 m	Prim: 6.1 m Col: 8.8 m
Unrestricted airflow	360°	360°	360°
Probe material	N/A	N/A	N/A
Residence time	N/A	N/A	N/A
Will there be changes within the next 18 mos?	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	No – not reference or equivalent method
Frequency of flow rate verification for manual PM samplers	Weekly	Weekly	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	N/A	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	11/18/10 05/18/10	11/18/10 05/18/10	11/18/10 05/18/10

Oakland

Site Name	Oakland
AQS ID	06-001-0009
GIS coordinates	37.7431 ° N, 122.1699° W
Location	Two-story commercial building
Address	9925 International Blvd, Oakland CA 94603
County	Alameda
Distance to road from gaseous probe	International Blvd: 19 meters 99th St: 23 meters 98th St: 43 meters
Traffic count	International Blvd: 26,912 ADT (2006) 99th St: 100 ADT (estimate) 98th St: 31,340 ADT (2002)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Oakland is an important area for air pollution monitoring because it is the largest city in Alameda County, with a population estimate of 390,724 according to the 2010 census. It has large emission sources within its boundaries, such as a major maritime port, an international airport, extensive areas of industry, and a number of major freeways. These sources have the potential to emit significant amounts of CO and ozone precursors, as well as particulates and organic toxic compounds.

The monitoring site is located seven miles southeast of downtown Oakland, on a commercial strip in a residential area. Ozone and NO_2 are measured to monitor population exposure to these pollutants. Carbon monoxide is measured because of the high volume of traffic in the city, which includes several major freeways. $PM_{2.5}$ is measured due to the large emission sources in the area, and because light winds combined with wood burning, vehicular traffic, and surfaced based inversions during winter can cause elevated particulate concentrations.

VOC toxic compounds are also sampled at Oakland on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, the national 24-hour $PM_{2.5}$ standard was exceeded once at this site. No exceedances of the national standards for ozone, NO2 or CO were measured during the last three years.

Oakland Monitor Information

Pollutant	O3	CO	NO/NO2	Continuous PM2.5 FEM BAM
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Middle	Middle	Middle	Middle
Sampling method	TECO 49i	API 300E	TECO 42i	Met One FEM BAM 1020
Analysis method	N/A	N/A	N/A	N/A
Start date	11/01/07	11/01/07	11/01/07	10/01/2009
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	10 m	10 m	10 m	8.0 m
Probe height above roof	4 m	4 m	4 m	2.4 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	21 m	21 m	21 m	21 m
Distance to furnace or incinerator flue	8.2 m	8.2 m	8.2 m	5.0 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	N/A
Residence time	13 s	14 s	13 s	N/A
Will there be changes within the next 18 mos?	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	Yes
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	N/A
Last Annual Performance Evaluation (gaseous)	11/18/10	11/18/10	11/18/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	08/25/10 05/18/10

Oakland West

Site Name	Oakland West
AQS ID	06-001-0011
GIS coordinates	37.8148 ° N, 122.2823° W
Location	Trailer in parking lot
Address	1100 21st St, Oakland CA 94607
County	Alameda
Distance to road from gaseous probe	Grand Ave: 34 meters Linden St: 33 meters Adeline St: 168 meters 21st St: 80 meters
Traffic count	Grand Ave: 19,796 ADT (2002) Linden St: 500 ADT (estimate) Adeline St: 7,586 ADT (2002) 21st St: 500 ADT (estimate)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

The Air District opened a monitoring station one mile downwind of the Port of Oakland in February 2009 because the Port of Oakland is considered a major area source of diesel particulate matter emissions. Studies have shown that the West Oakland community is exposed to higher concentrations of diesel particulate matter than elsewhere in the Bay Area, resulting in higher potential cancer risks.

Carbon monoxide, NO_2, and continuous $PM_{2.5}$ are measured to determine the impact of emissions from the Port of Oakland and its associated diesel-truck traffic, and vehicle traffic from nearby highways. SO_2 is measured to determine the impact of emissions from ship traffic. Ozone monitoring was added on December 13, 2010. Measurements of all these criteria pollutants are also used for comparisons to data obtained from non-standard sampling methodologies employed in West Oakland Measurement Study (WOMS) project, described later in this report.

Because the Port of Oakland can be a large source of VOC toxic compounds, the Air District has been sampling for toxics since 2001 at a site several blocks from the current Oakland West monitoring site. Toxics monitoring was moved to the new station when it opened in February 2009. VOC toxic compounds are sampled at Oakland West on a 1-in-12 day schedule, and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

There have been no exceedances of the national standards for NO_2, SO_2 (the new 75 ppb standard) or CO since the site opened in February 2009. There have also been no measurements above the national 24-hour $PM_{2.5}$ standard.

Oakland West Monitor Information

Pollutant	O3	CO	NO/NO2	SO2
Monitoring Objective	Population oriented	Source Impact	Source Impact	Source Impact
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49C	Teledyne 300E	TECO 42C	TECO 43C
Analysis method	N/A	N/A	N/A	N/A
Start date	12/13/10	02/25/09	02/25/09	02/25/09
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	5.7 m	5.7 m	5.7 m	5.7 m
Probe height above roof	3.1 m	3.1 m	3.1 m	3.1 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	40 m	40 m	40 m	40 m
Distance to furnace or incinerator flue	N/A	N/A	N/A	N/A
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon
Residence time	9 s	10 s	10 s	10 s
Will there be changes within the next 18 mos?	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	12/28/10	07/28/10	07/28/10	07/28/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A

Oakland West Monitor Information

Pollutant	Continuous PM2.5 BAM	Speciated PM2.5
Monitoring Objective	Source Impact	Source Impact
Spatial scale	Neighborhood	Neighborhood
Sampling method	Met One BAM 1020	Met One SASS
PM filter analysis method	N/A	Weighed by DRI
Data Start date	02/25/09	02/12/09
Operation schedule	Continuous	1-in-6
Sampling season	All year	All year
Probe height (AGL)	5.2 m	4.7 m
Probe height above roof	2.6 m	2.1 m
Distance from obstructions on roof	None	None
Dist from obstructions not on roof	None	None
Dist from tree (DL)	40 m	39 m
Distance to furnace or incinerator flue	N/A	N/A
Distance between collocated monitors	N/A	N/A
Distance between PM10 and PM2.5 monitors	BAM to SASS: 1.1 m	SASS to BAM: 1.1 m
Unrestricted airflow	360°	360°
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes w/in the next 18 mos?	No	No
Is it suitable for comparison against the annual PM2.5?	No – not reference or equivalent method	No
Frequency of flow rate verification for manual PM samplers	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers	Every two weeks	N/A
Frequency of one-point QC check (gaseous)	N/A	N/A
Last Annual Perform. Evaluation (gaseous)	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	11/15/10 01/25/10	11/15/10 05/17/10

Point Reyes

Site Name	Point Reyes
AQS ID	06-041-0003
GIS coordinates	38.1228° N, 122.9083° W
Location	At ground level behind a ranger residence
Address	170 Pierce Point Rd, Point Reyes CA 94956
County	Marin
Distance to road from probe	Pierce Point Rd: 95 meters
Traffic count	Pierce Point Rd: 225 ADT (estimate)
Groundcover	Grass
Representative Area	San Francisco-Oakland-Fremont MSA

Point Reyes was chosen for an air monitoring site because it is representative of background $PM_{2.5}$ levels. Air pollution levels at this site are usually low due to the rural nature of the area and because the upwind air flow is usually from the Pacific Ocean 2.5 miles to the west.

The site is located within the Point Reyes National Seashore. Within the park are scattered dairy farms. There are no industrial sources within 20 miles of the park. Between the ocean and the air monitoring site the land is relatively flat with low vegetation. The air monitoring site is located behind a ranger residence at the north end of the park. The closest towns are Marshall, three miles to the northeast with a population of a few hundred; and Inverness three miles to the southeast with a population of 1304 according to the 2010 census.

The continuous $PM_{2.5}$ (BAM) monitor at Point Reyes recorded two days above the national 24-hour $PM_{2.5}$ standard during the most recent three years. However, this monitor is not a recognized FRM or FEM method, and the data cannot be used to determine violations of the national $PM_{2.5}$ standards, or its attainment status. Only FRM or FEM based $PM_{2.5}$ measurements may be used for comparison with national $PM_{2.5}$ standards. This site is operated by the California Air Resources Board.

Point Reyes Monitor Information

Pollutant	Continuous PM2.5 BAM
Monitoring Objective	General Background
Spatial scale	Regional
Sampling method	Met One BAM 1020
PM filter analysis method	N/A
Start date	12/01/00
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	2.1 m
Probe height above ground	2.1 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	35 m
Distance to furnace or incinerator flue	>50 m
Distance between collocated monitors	N/A
Unrestricted airflow	360°
Probe material	N/A
Residence time	N/A
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	No – not reference or equivalent method
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	2 times per month
Frequency of one-point QC check (gaseous)	N/A
Last Annual Performance Evaluation (gaseous)	N/A
Last two semi-annual flow rate audits for PM monitors	09/09/10 10/15/09

Point Richmond

Site Name	Point Richmond
AQS ID	06-013-0005
GIS coordinates	37.9261° N, 122.3856° W
Location	Air monitoring shelter next to fire station
Address	140 W. Richmond Ave, Richmond CA 94801
County	Contra Costa
Distance to road From gaseous probe	W. Richmond Ave: 10.2 meters Interstate 580: 266 meters
Traffic count	W. Richmond Ave: 1,340 ADT (2003) Interstate 580: 70,000 ADT (2007)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont (MSA)

Point Richmond was chosen for H_2S source impact monitoring because the community is at the immediate southern periphery of the Chevron Refinery. Although prevailing winds in the area are from the south-southwest, occasional northerly winds will transport H_2S emissions from the refinery over the community. H_2S gases at Chevron can be emitted from the processing units, one mile to the north, or the Chevron Richmond Long Wharf Complex, one mile to the west, where crude oil and other feedstock chemicals from tankers are unloaded.

The monitoring site is located in downtown Point Richmond, 0.2 miles south of the Chevron Refinery boundary. Point Richmond, a neighborhood within the City of Richmond has a population of 3780 according to the 2010 census.

Point Richmond Monitor Information

Pollutant	H2S
Monitoring Objective	Source impact
Spatial scale	Neighborhood
Sampling method	TECO 45C
PM filter analysis method	N/A
Data Start date	01/01/99
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	3.4 m
Probe height above roof	0.9 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	17 m
Distance to furnace or incinerator flue	7.3 m
Distance between collocated monitors	N/A
Unrestricted airflow	360º
Probe material	Teflon
Residence time	6 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every two weeks
Last Annual Performance Evaluation (gaseous)	11/12/10
Last two semi-annual flow rate audits for PM monitors	N/A

Redwood City

Site Name	Redwood City
AQS ID	06-081-1001
GIS coordinates	37.4830° N 122.2036° W
Location	One-story commercial building
Address	897 Barron Ave, Redwood City CA 94063
County	San Mateo
Distance to road from gaseous probe	Barron Ave: 13 meters Bay Road: 24 meters Warrington Ave: 131 meters US Highway 101: 455 meters
Traffic count	Barron Ave: 1,200 ADT (2009) Bay Road: 8350 ADT (2008) Warrington Ave: 1140 ADT (2008) US Highway 101: 194,000 ADT (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Redwood City was chosen for an air monitoring site because it is one of the largest cities in San Mateo County, with a population of 76,815 according to the 2010 census. Being approximately midway between San Francisco and San Jose, it is well positioned to monitor the progression of ozone precursors and ozone moving southward down the peninsula as they are channeled by the Santa Cruz Mountains. Generally, Redwood City characterizes an area between South San Francisco and Palo Alto, which has a low air pollution potential due to the frequent presence of the sea breeze. Although the sea breeze typically keeps pollution levels low, when winds are light high levels of ozone precursors, ozone, or particulates can occur due to the large number of sources in the area.

The air monitoring site is located in a commercial/industrial zone bordered by US Highway 101 on one side and residential areas on the other three sides. NO, NO_2 and ozone are collected because the area is a large source of ozone precursor emissions and ozone. Carbon monoxide is monitored because of the high volume of traffic in the area, and US Highway 101 is only 0.3 miles north of the site. $PM_{2.5}$ is collected because light winds combined with surface-based inversions during the winter months can cause particulate levels to become elevated.

VOC toxic compounds are also sampled at Redwood City on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

An FRM $PM_{2.5}$ monitor at this site acts as the collocated monitor for the FEM $PM_{2.5}$ monitoring network. The collocated FRM PM2.5 monitor sampling frequency was 1-in-12 days January through March but was increased to 1-in-6 days from April through December in order to obtain a larger sample size to compare the FRM concentration to the FEM-BAM

concentration. The Air District plans to continue operating this sampler on a 1-in-6 day schedule indefinitely.

The national 24-hour $PM_{2.5}$ standard was exceeded on one day during the last three years. No exceedances of the national standards for ozone, NO_2 or CO were measured during the last three years.

Redwood City Monitor Information

Pollutant	**O3**	**CO**	**NO/NO2**
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 48A	TECO 42C
PM filter analysis method	N/A	N/A	N/A
Data Start date	07/01//76	03/01/67	03/01/67
Operation schedule	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year
Probe height (AGL)	6.8 m	6.8 m	6.8 m
Probe height above roof	3.6 m	3.6 m	3.6 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	46 m	46 m	46 m
Distance to furnace or incinerator flue	12.7 m	12.7 m	12.7 m
Distance between collocated monitors	N/A	N/A	N/A
Unrestricted airflow	360º	360º	360º
Probe material	Teflon	Teflon	Teflon
Residence time	10 s	10 s	10 s
Will there be changes within the next 18 mos?	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	08/17/10	08/17/10	08/17/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A

Redwood City Monitor Information

Pollutant	Continuous PM2.5 FEM BAM	FRM PM2.5 Collocated
Monitoring Objective	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood
Sampling method	Met One FEM 1020	Partisol-Plus 2025 w/VSCC
PM filter analysis method	N/A	Weighed by Air District
Data Start date	10/01/09	10/01/09
Operation schedule	Continuous	Jan-Mar: 1-in-12 Apr-Dec: 1-in-6
Sampling season	All year	All year
Probe height (AGL)	5.5 m	5.3 m
Probe height above roof	2.2 m	2.2 m
Distance from obstructions on roof	None	None
Dist from obstructions not on roof	None	None
Distance from tree (DL)	47 m	44 m
Distance to furnace or incinerator flue	11.0 m	14.0 m
Distance between collocated monitors	4 m	4 m
Distance between PM2.5 samplers	BAM to PM2.5: 4.0 m	PM2.5 to FEM BAM : 4.0 m
Unrestricted airflow	360º	360º
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes within the next 18 mos?	No	No
Is it suitable for comparison against the annual PM2.5?	Yes	Yes
Frequency of flow rate verification for manual PM samplers	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers	Every two weeks	N/A
Frequency of one-pt QC check (gaseous)	N/A	N/A
Last Annual Perform. Evaluation (gaseous)	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	08/16/10 02/09/10	08/16/10 02/09/10

Richmond 7th

Site Name	Richmond 7th
AQS ID	06-013-0006
GIS coordinates	37.9481° N, 122.3648° W
Location	Fire station
Address	1065 7th Street, Richmond CA 94801
County	Contra Costa
Distance to road from gaseous probe	7th St: 21.4 meters Hensley St: 29.8 meters Richmond Parkway: 200 meters
Traffic count	7th St: 3,125 ADT (2007) Hensley St: 2,125 ADT (2007) Richmond Parkway: 35,650 ADT (2007)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

Richmond 7th was chosen for H_2S and SO_2 source impact monitoring because it is near the eastern boundary of the Chevron Refinery. Normally, monitoring is done downwind of the prevailing wind direction. However, the prevailing winds are from the south, and carry emissions over San Pablo Bay. Since it is impractical to monitor over San Pablo Bay, a monitoring site was chosen downwind of the secondary wind direction, on the east side of the refinery. The site is located 0.5 miles east of the refinery boundary, where the monitor is expected to measure the highest concentrations in an area where the public has access.

VOC toxic compounds are also sampled at Richmond 7th on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

SO_2 concentrations measured at Richmond 7th did not exceed the new national 1-hour 75 ppb standard during the last three years.

Richmond 7th Monitor Information

Pollutant	SO2	H2S
Monitoring Objective	Source impact	Source impact
Spatial scale	Neighborhood	Neighborhood
Sampling method	TECO 43C	TECO 43C
PM filter analysis method	N/A	N/A
Start date	07/01/80	01/01/99
Operation schedule	Continuous	Continuous
Sampling season	All year	All year
Probe height (AGL)	8.4 m	8.4 m
Probe height above roof	2.8 m	2.8 m
Distance from obstructions on roof	None	None
Distance from obstructions not on roof	None	None
Distance from tree (DL)	10 m	10 m
Distance to furnace or incinerator flue	12.2 m	12.2 m
Distance between collocated monitors	N/A	N/A
Unrestricted airflow	360°	360°
Probe material	Teflon	Teflon
Residence time	8 s	9 s
Will there be changes within the next 18 mos?	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every two weeks
Last Annual Performance Evaluation (gaseous)	10/21/10	10/21/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A

Rodeo

Site Name	Rodeo
AQS ID	06-013-0007
GIS coordinates	38.0343º N, 122.2704º W
Location	Single story storage area at fire station
Address	326 Third Street, Rodeo CA 94572
County	Contra Costa
Distance to road from gaseous probe	Third St: 13.3 meters Parker St: 249.0 meters
Traffic count	Third St: 500 ADT (estimate) Parker St: 7,316 ADT (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont (MSA)

Rodeo was chosen for H_2S source impact monitoring because the ConocoPhillips Refinery is on the eastern boundary of the town of Rodeo. Although the prevailing winds in the area are from the southwest, northeast winds can transport H_2S emissions from the refinery over the populated area of the town. The population of Rodeo is 8,679 according to the 2010 census. The monitoring site is located in a residential area 0.6 miles southwest of the ConocoPhillips Refinery boundary.

Rodeo Monitor Information

Pollutant	**H2S**
Monitoring Objective	Source impact
Spatial scale	Neighborhood
Sampling method	TECO 45C
PM filter analysis method	N/A
Start date	04/01/02
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	6.7 m
Probe height above roof	2.0 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	>50 m
Distance to furnace or incinerator flue	10.9 m
Distance between collocated monitors	N/A
Unrestricted airflow	360°
Probe material	Teflon
Residence time	15 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers audit	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every two weeks
Last Annual Performance Evaluation (gaseous)	09/08/10
Last two semi-annual flow rate audits for PM monitors	N/A

San Francisco

Site Name	San Francisco
AQS ID	06-075-0005
GIS coordinates	37.7659° N, 122.3990° W
Location	One-story commercial building
Address	10 Arkansas St, Suite N, San Francisco CA 94107
County	San Francisco
Distance to road from gaseous probe	16th St: 32.0 meters Arkansas St: 17.0 meters Interstate 280: 300 meters U.S. Highway 101: 504 meters
Traffic count	16th St: 12,278 ADT (2006) Arkansas St: 500 ADT (estimate) Interstate 280: 88,000 ADT (2009) U.S. Highway 101: 225,000 (2009)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

San Francisco was chosen for an air monitoring site because it is the second largest city in the San Francisco Bay Area, with a population of 805,235 according to the 2010 census. Although the sea breeze typically keeps pollution levels low, light wind conditions can result in high levels of ozone precursors or particulates due to the large number of sources in the city. The east side of the city was selected for a monitoring site because it is more densely populated (including a large number of daytime visitors and commuters), has some industry, and as a transportation hub, has generally higher traffic volume. The site is located near the fringe of the central business district, in an area of light industry that is close to a residential area and two major freeways.

Ozone is measured because of the very high population density of the city. NO/NO_2 and CH_4/NMHC have been measured because this is a source area for these ozone precursors. Carbon monoxide is measured because of the high traffic volume. PM_{10} and $PM_{2.5}$ are measured because stagnant days combined with surface based-based inversions can cause elevated particulate levels, and because of the contribution of heavy vehicular traffic to PM levels.

Monitoring of CH_4/NMHC was discontinued on September 30, 2010 because of the development of PAMS network (described elsewhere in this report), which is a more effective allocation of resources. The PAMS network better defines the measurement and sources of ozone precursors, making additional measurements of CH_4/NMHC at San Francisco superfluous.

VOC toxic compounds are sampled at San Francisco by both the Air District and CARB on a 1-in-12 day schedule and analyzed by their respective laboratories. Carbonyls and metals are also sampled by CARB on the same 1-in-12 day schedule. Information about the CARB toxics monitoring program can be found at http://www.arb.ca.gov/toxics/toxics.htm.

Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

During the most recent three years, the national 24-hour $PM_{2.5}$ standard was exceeded on four days. No exceedances of the national standards for ozone, PM_{10}, NO_2, or CO were measured in the last three years.

San Francisco Monitor Information

Pollutant	**O3**	**CO**	**NO/NO2**	**CH4/NMHC***
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49C	TECO 48	TECO 42i	TECO 55C
PM Filter Analysis method	N/A	N/A	N/A	N/A
Start date	01/01/86	01/01/86	NO: 12/01/85 NO2: 01/01/86	CH4: 01/01/94 NMHC: 07/12/06
Operation schedule	Continuous	Continuous	Continuous	Continuous*
Sampling season	All year	All year	All year	All year*
Probe height (AGL)	10.5 m	10.5 m	10.5 m	10.5 m
Probe height above roof	4.4 m	4.4 m	4.4 m	4.4 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	15.3 m	15.3 m	15.3 m	15.3 m
Distance to furnace or incinerator flue	5.2 m	5.2 m	5.2 m	5.2 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon
Residence time	10 s	10 s	11 s	11 s
Will there be changes within the next 18 mos?	No	No	No	Monitor closed
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	09/16/10	09/16/10	09/16/10	09/16/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A

* CH4/NMHC analyzer removed from service on September 30, 2010.

San Francisco Monitor Information

Pollutant	PM10	Continuous PM2.5 FEM BAM
Monitoring Objective	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood
Sampling method	Andersen HiVol 1200	Met One FEM BAM 1020
PM Filter Analysis method	Weighed by Air District	N/A
Start date	11/16/86	10/01/09
Operation schedule	1-in-6	Continuous
Sampling season	All year	All year
Probe height (AGL)	7.6 m	8.3 m
Probe height above roof	1.5 m	2.2 m
Distance from obstructions on roof	None	None
Distance from obstructions not on roof	None	None
Distance from tree (DL)	17.5 m	15.9 m
Distance to furnace or incinerator flue	7.0 m	7.3 m
Distance between collocated monitors	N/A	N/A
Distance between PM10 and PM2.5 samplers	2.3 m	2.3 m
Unrestricted airflow	360°	360°
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes within the next 18 mos?	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	Yes
Frequency of flow rate verification for manual PM samplers	Weekly	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	12/09/10 06/08/10	12/09/10 06/08/10

San Jose

Site Name	San Jose
AQS ID	06-085-0005
GIS coordinates	37.3485° N, 121.8949° W
Location	Top floor of two-story commercial building
Address	158 E. Jackson St, San Jose CA 95112
County	Santa Clara
Distance to road from gaseous probe	Jackson St: 15.1 meters 4th St: 34.7 meters
Traffic count	Jackson St: 3,990 ADT (2007) 4th St: 6,000 ADT (2007)
Groundcover	Paved
Representative Area	San Jose-Sunnyvale-Santa Clara MSA

San Jose was chosen for an air monitoring site because it is the largest city in Santa Clara County and the largest city in the Bay Area, with a population of 945,942 according to the 2010 census.

Ozone precursors emitted within the central San Francisco Bay Area are often carried into the San Jose area by the prevailing northwesterly winds. The northern half of the Santa Clara Valley is densely populated and the associated activities of the residents also add significant pollutant emissions into the air.

The air monitoring site is located in the center of northern Santa Clara Valley, in a commercial and residential part of downtown San Jose. This area is completely encircled by major freeways, and has a large airport just to the west-northwest. The air quality in this location is representative of a large part of the valley due to the diurnal up valley and down valley air flow, which mixes the pollutants throughout the valley.

NO/NO_2, CH_4/NMHC and ozone are monitored because of the large amount of ozone precursor emissions near the area as well as from upwind areas. Carbon monoxide is measured because of the significant traffic volume in the area. PM_{10} and $PM_{2.5}$ are monitored because light winds combined with surface based inversions within the valley during winter months can cause elevated particulate levels.

Gaseous VOC toxic compounds, carbonyls, and metals are sampled at San Jose on a one in six day schedule as part of the NATTS program. Gaseous toxic compounds and carbonyls are analyzed by the Air District laboratory while metals are analyzed by an outside laboratory. CARB also does sampling for VOC toxic compounds, carbonyls, and metals at San Jose but this sampling is on a 1-in-12 day schedule and the analysis is done by the CARB laboratory. More information about the CARB toxics monitoring program can be found at http://www.arb.ca.gov/toxics/toxics.htm. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

The San Jose station was approved by EPA as a National Core (NCore) multi-pollutant monitoring station on October 30, 2009 with NCore air monitoring to begin on January 1, 2011. The NCore program requires reporting of PM coarse ($PM_{10-2.5}$) every 3rd day. Consequently, in 2011 the PM_{10} sampling frequency will change from 1-in-6 days to 1-in-3 days and the $PM_{2.5}$ summer frequency will change from 1-in-6 days to 1-in-3 days.

On December 14, 2010, EPA revised the monitoring requirements for lead and required lead monitoring at NCore sites. The lead measurements at San Jose will come from PM_{10} filters on a 1-in-6 day schedule. Because PM_{10} is sampled on a 1-in-3 day schedule, only every 2nd PM_{10} filter will undergo lead measurements starting in January 2011.

Monitoring of NO_y began at San Jose on January 1, 2011 to meet NCore requirements. NOy is total reactive nitrogen and plays an important role in ozone formation. A full description of the NCore monitoring program can be found in the NCore section of this document.

In the most recent three years, this site recorded five exceedances of the national 8-hour ozone standard and eight exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for PM_{10}, NO_2, SO_2 (the new 75 ppb 1-hour standard) or CO were measured during the last three years.

San Jose Monitor Information

Pollutant	O3	CO*	NO/NO2	CH4/NMHC	SO2*
Monitoring Objective	Population oriented	Population oriented & Highest concentration	Population oriented & Highest concentration	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 48iTLE	TECO 42C	TECO 55C	TECO 43iTLE
PM filter analysis method	N/A	N/A	N/A	N/A	N/A
Data start date	11/01/02	11/01/02	11/01/02	CH4: 11/22/02 NMHC: 07/06/06	02/10/09
Operation schedule	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	11.9 m	11.9 m	11.9 m	11.9 m	11.9 m
Probe height above roof	4.3 m	4.3 m	4.3 m	4.3 m	4.3 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	None	None	None	None	None
Distance from tree (DL)	13.1 m	13.1 m	13.1 m	13.1 m	13.1 m
Distance to furnace or incinerator flue	4.6 m	4.6 m	4.6 m	4.6 m	4.6 m
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	360º	360º	360º	360º	360º
Probe material	Teflon	Teflon	Teflon	Teflon	Teflon
Residence time	11 s	12 s	11 s	11 s	12 s
Will there be changes within the next 18 mos?	No	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	05/05/10	08/20/10	05/05/10	05/05/10	08/11/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	N/A

* High sensitivity instruments required for CO and SO_2 at NCore sites.

San Jose Monitor Information

Pollutant	PM10*	FRM PM2.5	Continuous PM2.5 BAM	Speciated PM2.5
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	Partisol 2025* without VSCC	Partisol-Plus 2025 w/VSCC	Met One Model 1020	Met One SASS
PM filter analysis method	Weighed by Air District	Weighed by Air District	N/A	Weighed by RTI
Data start date	10/15/02	10/05/02	01/01/04	10/05/02
Operation schedule	1-in-6	Apr-Sep:1-in-6 Oct-Mar: daily	Continuous	1-in-3
Sampling season	All year	All year	All year	All year
Probe height	8.9 m	8.9 m	9.8m	8.9 m
Probe height above roof	2.2 m	2.2 m	2.0 m	2.1 m
Distance from obstructions on roof	None	None	None	None
Dist from obstructions not on roof	None	None	None	None
Distance from tree (DL)	11.0 m	14.9 m	11.9 m	16.1 m
Distance to furnace or incinerator flue	1.5 m	3.0 m	3.4 m	2.4 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Distance between PM10 and PM2.5 samplers	PM10 to PM2.5: 3.2m PM10 to SASS: 4.1m PM10 to BAM: 3.5 m	PM2.5 to PM10: 3.2 m PM2.5 to PM10: 4.1 m PM2.5 to BAM: 3.9 m	BAM to PM10: 3.5 m BAM to PM2.5: 3.9 m BAM to SASS: 7.9 m	SASS to PM10: 4.1 m SASS to BAM: 7.9 m SASS to PM2.5: 4.1 m
Unrestricted airflow	360º	360º	360º	360º
Probe material	N/A	N/A	N/A	N/A
Residence time	N/A	N/A	N/A	N/A
Will there be changes within the next 18 mos?	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	Yes	No – not reference or equivalent method	No
Frequency of flow rate verification for manual PM samplers	Monthly	Monthly	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	Every two weeks	N/A
Frequency of 1-pt QC check (gaseous)	N/A	N/A	N/A	N/A
Last Annual Perform. Evaluation (gaseous)	N/A	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	08/10/10 02/02/10	08/10/10 02/02/10	08/10/10 02/02/10	05/04/10 02/02/10

* Partisol 2025 Low Volume replaced Anderson 1200 HiVol on 12/22/10.

San Martin

Site Name	San Martin
AQS ID	06-085-2006
GIS coordinates	37.0794° N 121.6000° W
Location	Air monitoring shelter next to maintenance shed
Address	13030 Murphy Ave, San Martin CA 95046
County	Santa Clara
Distance to road from gaseous probe	Murphy Ave: 57.0 meters US Highway 101: 455 meters
Traffic count	Murphy Ave: 400 ADT (2009) US Highway 101: 107,000 ADT (2008)
Groundcover	Vegetative
Representative Area	San Jose- Sunnyvale- Santa Clara MSA

San Martin was chosen as an ozone air monitoring site because earlier field measurements showed this area to have the highest ozone concentrations in the Santa Clara Valley. Prevailing winds transport ozone and ozone precursors down the valley from the densely populated San Jose area as well as the surrounding San Francisco Bay. Because ozone is formed by a chemical reaction between organic and nitrogen oxide gases in the presence of sunlight, the highest ozone concentrations are usually observed tens of miles downwind from the highest concentration of emission sources (freeways, power generating facilities, etc.) because the reactions involving the organic gases are relatively slow.

San Martin is located in an agricultural area at the south end of the Santa Clara Valley approximately 24 miles southeast of downtown San Jose. The town has a small population of 7,027 (2010 Census) and no industrial sources. The monitoring site is located at the South County Airport, in the center of the valley and about 0.3 miles west of US Highway 101.

In the most recent three years, this site recorded eleven exceedances of the national 8-hour ozone standard.

San Martin Monitor Information

Pollutant	O3
Monitoring Objective	Highest concentration
Spatial scale	Neighborhood
Sampling method	TECO 49C
PM filter analysis method	N/A
Data Start date	04/30/94
Operation schedule	Continuous
Sampling season	Apr 1 – Nov 30
Probe height (AGL)	4.8 m
Probe height above roof	2.8 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	23 m
Distance to furnace or incinerator flue	N/A
Distance between collocated monitors	N/A
Unrestricted airflow	360º
Probe material	Teflon
Residence time	14 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	Every other day
Last Annual Performance Evaluation (gaseous)	07/26/10
Last two semi-annual flow rate audits for PM monitors	N/A

San Pablo

Site Name	San Pablo
AQS ID	06-013-1004
GIS coordinates	37.96041° N, 122.35685° W
Location	One story commercial building
Address	1865-D Rumrill Blvd, San Pablo CA 94806
County	Contra Costa
Distance to road from gaseous probe	Rumrill Blvd: 15.8 meters
Traffic count	Rumrill Blvd: 16,800 ADT (2010)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

San Pablo was chosen for an air monitoring site because the area is in the most populated portion of western Contra Costa County. San Pablo, with a population of 29,139 (according to the 2010 census), is almost completely surrounded by the city of Richmond. Richmond has a population of 103,701 according to the 2010 census. This area has heavy industry, high traffic volume, including two major freeways, and it is very close to the Chevron Refinery. Ozone and NO_2 are measured because the area is downwind of the central San Francisco Bay Area, which is a large source of ozone precursor emissions. Carbon monoxide is measured because the high traffic volume in the area. SO_2 is measured because the site is 1.2 miles downwind of the Chevron refinery, which can be a significant source of SO_2 emissions. PM_{10} is measured because stagnant days in the fall and winter can result in elevated particulate levels.

VOC toxic compounds are also sampled at San Pablo on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

The station was temporarily closed from March 2009 to May 2010 due to heavy damage from a fire in the building.

This site recorded one exceedance of the national 8-hour ozone standard during the last three years (as noted above, operations were suspended during a portion of this period). No exceedances of the national standards for NO_2, SO_2 (the new 75 ppb 1-hour standard), CO or PM_{10} were measured during the past three years.

San Pablo Monitor Information

Pollutant	O3	CO	NO/NO2	SO2	PM10
Monitoring Objective	Population oriented	Population oriented	Population oriented	Source Impact	Population oriented
Spatial scale	Middle	Middle	Middle	Neighborhood	Middle
Sampling method	TECO 49i	TECO 48i	TECO 42i	TECO 43i	Tisch Env. HiVol TE-6000
PM filter analysis method	N/A	N/A	N/A	N/A	Weighed by Air District
Start date	09/13/02	09/13/02	09/13/02	09/13/02	09/23/02
Operation schedule	Continuous	Continuous	Continuous	Continuous	1-in-6
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	9.0 m	9.0 m	9.0 m	9.0 m	6.4 m
Probe height above roof	5.6 m	5.6 m	5.6 m	5.6 m	2.2 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	None	None	None	None	None
Distance from tree (DL)	>50 m	>50 m	>50 m	>50 m	>50 m
Distance to furnace or incinerator flue	None	None	None	None	None
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon	N/A
Residence time	8 s	9 s	8 s	8 s	N/A
Will there be changes within the next 18 mos?	No	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A	Weekly
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day	N/A
Last Annual Performance Evaluation (gaseous)	06/02/10	06/02/10	06/02/10	06/02/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	11/18/10 06/02/10

San Rafael

Site Name	San Rafael
AQS ID	06-041-0001
GIS coordinates	37.9724° N, 122.5200° W
Location	Second floor of two-story commercial building
Address	534 4th Street, San Rafael CA 94901
County	Marin
Distance to road from gaseous probe	4th St: 18 meters Irwin St: 48 meters US Highway 101: 112 meters
Traffic count	4th St: 4,248 ADT (2010) Irwin St: 17,531 ADT (2007) US Highway 101: 150,500 ADT (2009)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

San Rafael was chosen for an air monitoring site because it is the largest city in Marin County with a population of 57,713 according to the 2010 census. The city's climate and air quality is representative of that found throughout the populous eastern side of the county. Afternoon sea breezes typically keep pollution levels low. However, when the sea breeze is absent, local sources can cause elevated pollution levels.

The monitoring site is located in a commercial building about a block east of US Highway 101 and near major highway access ramps. It is one half mile east of the downtown San Rafael business district. There is no industrial activity in the immediate area. Ozone and NO/NO_2 are measured to monitor general population exposure to these pollutants. Carbon monoxide and PM_{10} are measured because the site is close to a major transportation corridor. $PM_{2.5}$ is measured because light winds combined with wood burning, vehicular traffic, and surfaced based inversions during winter can cause elevated particulate concentrations.

VOC toxic compounds are also sampled at San Rafael on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

In October 2009, a continuous Federal Equivalent Method (FEM) $PM_{2.5}$ monitor was added to this site as the Air District's $PM_{2.5}$ network was expanded to have at least one monitor per county. The FEM $PM_{2.5}$ monitor provides hourly measurements of $PM_{2.5}$ concentrations.

Since $PM_{2.5}$ monitoring began in October 2009, four exceedances of the national 24-hour $PM_{2.5}$ standard have been measured. No exceedances of the national standards for ozone, PM_{10}, NO_2 or CO were measured during the last three years.

San Rafael Monitor Information

Pollutant	O3	CO	NO/NO2	PM10	Continuous PM2.5 FEM BAM
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Middle	Middle	Middle	Middle	Middle
Sampling method	TECO 49i	TECO 48i	TECO 42C	Andersen HiVol 1200	Met One FEM 1020
PM filter Analysis method	N/A	N/A	N/A	Weighed by Air District	N/A
Start date	07/01/76	10/01/67	NO: 01/01/68 NO2:10/01/67	11/04/86	10/27/09
Operation schedule	Continuous	Continuous	Continuous	1-in-6	Continuous
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	11.9 m	11.9 m	11.9 m	7.0 m	7.1 m
Probe height above roof	5.2 m	5.2 m	5.2 m	1.9 m	2.0 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	21 m	21 m	21 m	20 m	18.5 m
Distance from tree (DL)	14 m	14 m	14 m	15 m	12.5 m
Distance to furnace or incinerator flue	3.5 m	3.5 m	3.5 m	2.3 m	3.4 m
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Distance between PM10 and PM2.5 samplers	N/A	N/A	N/A	3.2 m	3.2 m
Unrestricted airflow	360°	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	N/A	N/A
Residence time	11 s	11 s	13 s	N/A	N/A
Will there be changes within the next 18 mos?	No	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	Yes
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	Weekly	Every two weeks
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	N/A	N/A
Last Annual Performance Evaluation (gaseous)	09/21/10	09/21/10	09/21/10	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	12/07/10 06/15/10	12/07/10 06/15/10

Santa Rosa

Site Name	Santa Rosa
AQS ID	06-097-0003
GIS coordinates	38.4435° N, 122.7102° W
Location	Second floor of two-story commercial building
Address	837 5th St, Santa Rosa CA 95404
County	Sonoma
Distance to road from gaseous probe	5th St: 24 meters E St: 79 meters College Ave: 210 meters Brookwood Ave: 228 meters US Highway 101: 918 meters
Traffic count	5th St: 2,347 ADT (2009) E St: 5,876 ADT (2009) College Ave: 13,304 ADT (2009) Brookwood Ave: 15,604 ADT (2009) US Highway 101: 109,000 ADT (2009)
Groundcover	Paved
Representative Area	Santa Rosa-Petaluma MSA

Santa Rosa was chosen for an air monitoring site because it is the largest city in Sonoma County with a population of 167,814 according to the 2010 census. The city's climate is strongly influenced by the Pacific Ocean and the marine air flow typically keeps pollution levels low. However, during light winds or strong nighttime temperature inversions, local sources can cause elevated pollution levels. The monitoring site is located just east of the downtown urban core and 0.5 miles east of US Highway 101.

There are no industrial sources in the immediate area. Ozone and NO/NO_2 are measured to monitor general population exposure to these pollutants. Carbon monoxide is measured because of the local urban traffic volume and proximity to the Highway 101 transportation artery. $PM_{2.5}$ is measured because light winds combined with wood burning, vehicular traffic, and surface based-based inversions during the winter months can cause elevated particulate concentrations.

VOC toxic compounds are also sampled at Santa Rosa on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

Pollutant concentrations measured at Santa Rosa did not exceed the national standards for ozone, $PM_{2.5}$, NO_2 or CO during the last three years.

Santa Rosa Monitor Information

Pollutant	O3	CO	NO/NO2	Continuous PM2.5 FEM BAM
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 48i	TECO 42i	Met One FEM 1020
Analysis method	N/A	N/A	N/A	N/A
Start date	04/17/81	04/17/81	NO: 01/01/82 NO2:04/17/81	10/23/09
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	10.7 m	10.7 m	10.7 m	8.1 m
Probe height above roof	5.2 m	5.2 m	5.2 m	2.0 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	21 m	21 m	21 m	21 m
Distance from tree (DL)	13.7 m	13.7 m	13.7 m	13.7 m
Distance to furnace or incinerator flue	4.7 m	4.7 m	4.7 m	5.7 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	N/A
Residence time	8 s	10 s	9 s	N/A
Will there be changes within the next 18 mos?	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	Yes
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	Every two weeks
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	N/A
Last Annual Performance Evaluation (gaseous)	12/08/10	12/08/10	12/08/10	N/A
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	12/07/10 06/15/10

Vallejo

Site Name	Vallejo
AQS ID	06-095-0004
GIS coordinates	38.1025° N, 122.2380° W
Location	One story commercial building
Address	304 Tuolumne St, Vallejo CA 94590
County	Solano
Dist. to road from probe	Tuolumne St: 18 meters Capitol St: 30 meters Solano Ave: 33 meters Interstate 80: 700 meters
Traffic count	Tuolumne St: 5,100 ADT (2008) Capitol St: 500 ADT (estimate) Solano Ave: 8,600 ADT (2008) Interstate 80: 141,000 ADT (2009)
Groundcover	Paved
Representative Area	Vallejo-Fairfield MSA

Vallejo was chosen for an air monitoring site because it is the largest city in Solano County with a population of 115,942 according to the 2010 census. Vallejo has the potential to be impacted by pollution from three directions: southwest winds bringing ozone and ozone precursors from the San Francisco Bay Area, north winds bringing particulates from the Napa Valley, and east winds bringing ozone and particulates from the Central Valley.

The monitoring site is located in a mixed commercial and residential neighborhood one mile east of downtown and 0.5 miles west of Interstate 80. Ozone and NO/NO_2 are measured because southerly winds can transport ozone and its precursors into Vallejo from the heavily populated central Bay Area. Easterly winds can transport ozone from the Central Valley through the Carquinez Strait.

$PM_{2.5}$ is measured because high concentrations typically occur during the winter when nighttime valley drainage winds, wood burning, and shallow temperature inversions trap pollutants from local sources and the Napa Valley to the north. East winds can also transport particulate into Vallejo through the Carquinez Strait from the Central Valley.

Carbon monoxide is measured because Interstate 80 passes through the middle of the urban area east of the monitoring site. SO_2 is measured at Vallejo to monitor general population exposure and because refineries located to the south and east can be significant sources of SO_2.

Continuous $PM_{2.5}$ (BAM) monitoring was discontinued after September 13, 2010 because the Air District was preparing to install and test a continuous $PM_{2.5}$ FEM-BAM monitor. Testing was completed in late 2010 and both the new $PM_{2.5}$ FEM-BAM and the existing $PM_{2.5}$ FRM operated daily from January 1, 2011 through February 28, 2011. On March 1,

2011 the continuous FEM-BAM monitor replaced the FRM monitor and the FRM monitor was removed.

VOC toxic compounds are also sampled at Vallejo on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded one exceedance of the national 8-hour ozone standard and the national 24-hour $PM_{2.5}$ standard was exceeded on twelve days. No exceedances of the national standards for NO_2, SO_2 (the new 75 ppb 1-hour standard) or CO were measured during the last three years.

Vallejo Monitor Information

Pollutant	O3	CO	NO/NO2	SO2
Monitoring Objective	Population oriented	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49i	TECO 48i	TECO 42i	TECO 43i
PM Filter Analysis method	N/A	N/A	N/A	N/A
Start date	07/01/76	07/01/76	07/01/76	07/01/76
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	9.6 m	9.6 m	9.6 m	9.6 m
Probe height above roof	4.3 m	4.3 m	4.3 m	4.3 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	N/A	N/A	N/A	N/A
Distance to furnace or incinerator flue	3.7 m	3.7 m	3.7 m	3.7 m
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon
Residence time	10 s	12 s	12 s	12 s
Will there be changes within the next 18 mos?	No	No	No	No
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	11/03/10	11/03/10	11/03/10	11/03/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A

Vallejo Monitor Information

Pollutant	FRM PM2.5	Continuous PM2.5 BAM*	Speciated PM2.5
Monitoring Objective	Population oriented	Population oriented	Population oriented
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Sampling method	Partisol Plus 2025 w/VSCC	Met One BAM 1020	Met One SASS
PM Filter Analysis method	Weighed by Air District	N/A	Weighed by DRI
Start date	03/10/99	01/01/04	6/11/08
Operation schedule	Apr-Sep 1-in-6 Oct-Mar: daily	Continuous	1-in-6
Sampling season	All year	All year	All Year
Probe height (AGL)	6.5 m	5.8 m	6.6 m
Probe height above roof	2.3 m	1.9 m	2.3 m
Distance from obstructions on roof	None	None	None
Distance from obstructions not on roof	None	None	None
Distance from tree (DL)	N/A	N/A	N/A
Distance to furnace or incinerator flue	6.3m	2.5 m	5.4m
Distance between collocated monitors	N/A	N/A	N/A
Distance between SASS and PM2.5 samplers	PM2.5 to BAM: 3.7 m PM2.5 to SASS: 3.1 m	BAM to PM2.5: 3.7 m BAM to SASS: 2.9 m	SASS to PM2.5: 3.1 m SASS to BAM: 2.9 m
Unrestricted airflow	360°	360°	360°
Probe material	N/A	N/A	N/A
Residence time	N/A	N/A	N/A
Will there be changes within the next 18 mos?	Yes	Yes	No
Is it suitable for comparison against the annual PM2.5?	Yes	No – not reference or equivalent method	No
Frequency of flow rate verification for manual PM samplers	Monthly	N/A	Monthly
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks	N/A
Frequency of one-point QC check (gaseous)	N/A	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	11/02/10 05/11/10	08/17/10 05/11/10	11/02/10 05/11/10

* Continuous PM2.5 BAM was discontinued after 9/13/10.

Detailed Site Information for SPM Stations

Berkeley

Site Name	Berkeley
AQS ID	06-001-2004
GIS coordinates	38.8778° N, 122.3013° W
Location	Trailer in parking lot
Address	1398 6th St, Berkeley CA 94710
County	Alameda
Distance to road from gaseous probe	Camelia Street: 27 meters 6th Street: 34 meters Gilman Street: 164 meters Interstate 80: 484 meters
Traffic count	Camelia Street: 500 ADT (estimate) 6th Street: 1,500 ADT (estimate) Gilman Street: 21,700 (2000) Interstate 80: 266,500 (2008)
Groundcover	Paved
Representative Area	San Francisco-Oakland-Fremont MSA

The Air District began a three year ambient air monitoring study in Berkeley in December 2007. The purpose of the study is to determine the pollution impacts to local residents from vehicular traffic and industry along the Highway 80 corridor. According to the 2010 census the City of Berkeley has a population of 112,580. The site closed on December 31, 2010.

The west side of Berkeley has the highest pollutant emission density within the city. Traffic levels are extremely high on Highway 80, with frequent traffic slowdowns during morning and evening commute times, which can produce significant amounts of hydrocarbons and particulates. Industrial sources along the highway, particularly Pacific Steel Casting (PSC), have made local residents concerned about possible exposure to particulates and toxic compounds. These sources in the west side of Berkeley transport pollutants to the rest of the city due to prevailing westerly winds.

The mobile air monitoring station is sited in western Berkeley because this area is expected to have the highest impacts due to close proximity to the sources. The trailer is located 0.30 miles east of Highway 80 and 0.25 miles downwind from PSC in a residential neighborhood. Although the purpose of the study is primarily source-oriented exposure from the highway and local industry emissions, the Air District is also monitoring population exposure to criteria pollutants including ozone, NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$.

Gaseous toxic compounds and metals are sampled at Berkeley by the Air District on a 1-in-6 day schedule. In 2010, gaseous toxic compounds were analyzed at the Air District laboratory and metals were analyzed by CARB. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

Pollutant concentrations measured at Berkeley did not exceed the national standards for ozone, NO_2, SO_2 (the new 75 ppb 1-hour standard), CO, or PM_{10} since the site opened in December 2007. The continuous $PM_{2.5}$ (BAM) monitor recorded concentrations above the national 24-hour $PM_{2.5}$ standard on two days in 2008, one day in 2009, and no days in 2010. However, this monitor is not a recognized FRM or FEM method, and the data cannot be used to determine violations of the national $PM_{2.5}$ standards, or its attainment status. Only FRM or FEM based $PM_{2.5}$ measurements may be used for comparison with national $PM_{2.5}$ standards.

Hourly gaseous concentrations are available on the Air District web site. Pollutant summaries for all measurements from this study will be made available to local community groups and the City of Berkeley.

Berkeley Monitor Information

Pollutant	O3	CO	NO/NO2	SO2	CH4/NMHC
Monitoring Objective	Population Oriented & Source Impact	Population Oriented & Source Impact	Population Oriented & Source Impact	Population Oriented & Source Impact	Population Oriented & Source Impact
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49C	API 300E	TECO 42C	TECO 43C	TECO 55C
PM filter analysis method	N/A	N/A	N/A	N/A	N/A
Start date	12/13/07	12/13/07	12/13/07	12/13/07	CH4: 12/13/07 NMHC: 12/13/07
Operation schedule	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year	All year
Probe height (AGL)	5.1 m	5.1 m	5.1 m	5.1 m	5.1 m
Probe height above roof	2.5 m	2.5 m	2.5 m	2.5 m	2.5 m
Distance from obstructions on roof	None	None	None	None	None
Distance from obstructions not on roof	None	None	None	None	None
Distance from tree (DL)	18 m	18 m	18 m	18 m	18 m
Distance to furnace or incinerator flue	17 m	17 m	17 m	17 m	17 m
Distance between collocated monitors	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon	Teflon
Residence time	10 s	10 s	11 s	10 s	10 s
Will there be changes within the next 18 mos?	Site closed	Site closed	Site closed	Site closed	Site closed
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	12/29/10	12/29/10	12/29/10	12/29/10	12/29/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A	N/A

Berkeley Monitor Information

Pollutant	PM10	Continuous PM2.5 BAM
Monitoring Objective	Population Oriented & Source Impact	Population Oriented & Source Impact
Spatial scale	Neighborhood	Neighborhood
Sampling method	Tisch Env. HiVol TE-6000	Met One BAM 1020
PM Filter Analysis method	Weighed by Air District	N/A
Start date	12/14/07	12/18/07
Operation schedule	1-in-6	Continuous
Sampling season	All year	All year
Probe height (AGL)	4.3 m	4.8 m
Probe height above roof	1.5 m	2.2 m
Distance from obstructions on roof	None	None
Distance from obstructions not on roof	None	None
Distance from tree (DL)	20 m	17 m
Distance to furnace or incinerator flue	20 m	18 m
Distance between collocated monitors	N/A	N/A
Distance between PM10 and PM2.5 samplers	PM10 to BAM: 2.7 m	BAM to PM10: 2.7 m
Unrestricted airflow	360°	360°
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes within the next 18 mos?	Site closed	Site closed
Is it suitable for comparison against the annual PM2.5?	N/A	No – not reference or equivalent method
Frequency of flow rate verification for manual PM samplers	Weekly	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	04/13/10 12/29/10	04/14/10 12/29/10

Crockett

Site Name	Crockett
AQS ID	06-013-1001
GIS Coordinates	38.0549º N, 122.2332º W
Location	Pump house
Address	End of Kendall Avenue, Crockett CA 94525
County	Contra Costa
Distance to road from gaseous probe	San Pablo Ave: 68.4 meters
Traffic count	San Pablo Ave: 8,763 ADT (2007)
Groundcover	Vegetative
Representative Area	San Francisco-Oakland-Fremont MSA

Crockett was chosen for SO_2 source impact monitoring because it is downwind of the ConocoPhillips Refinery. Prevailing winds in the area are from the west, which transport SO_2 emissions from the refinery over the town of Crockett, a predominately residential community with a population of 3,094 according to the 2010 census. The monitoring site is located on the west side of Crockett 0.9 miles northeast of the refinery boundary. The only other major industry near Crockett is C&H Sugar, which is not a significant source of SO_2 emissions.

VOC toxic compounds are also sampled at Crockett on a 1-in-12 day schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

Crockett is classified as an SPM site. EPA siting criteria specifies that the probe be located at least 10 meters from the drip line of all trees. The closest tree drip line to the probe is 1.2 meters away, but since the tree is located outside of the required 180 degree arc of unrestricted airflow for source impact monitoring as determined by the predominant wind direction and the direction of the refinery, the close proximity of that tree is irrelevant. The closest tree drip line within the 180 degree arc is 4.9 meters from the probe, which does not meet siting criteria. The Air District has been unable to negotiate with the local homeowner's association for the removal of this tree. Even though one of the siting criteria for a SLAMS site cannot be met, the site is still suitable for source impact monitoring as an SPM site.

During the most recent three years, the national 1-hour SO_2 standard of 75 ppb was exceeded on two days.

Crockett Monitor Information

Pollutant	**SO2**
Monitor Objective	Source impact
Spatial scale	Neighborhood
Sampling method	TECO 43C
PM filter analysis method	N/A
Start date	01/01/79
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	6.2 m
Probe height above roof	2.4 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	4.9 m*
Distance to furnace or incinerator flue (m)	N/A
Distance between collocated monitors	N/A
Unrestricted airflow	270°
Probe material	Teflon
Residence time	10 s
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers audit	N/A
Frequency of flow rate verification for automated PM analyzers audit	N/A
Frequency of one-point QC check (gaseous)	Every other day
Last Annual Performance Evaluation (gaseous)	10/13/10
Last two semi-annual flow rate audits for PM monitors	N/A

* Closest tree within the 180 degree arc of unrestricted air flow for source impact monitoring.

Cupertino

Site Name	Cupertino
AQS ID	N/A
GIS coordinates	37.3216° N, 122.0713° W
Location	One story building
Address	22638 Stevens Creek Blvd. Cupertino CA 95014
County	Santa Clara
Distance to road from monitor	Stevens Creek Blvd: 40.2 m Prado Vista Drive: 36.6 m Foothill Blvd: 228.6 m Silver Oak Lane: 152.4 m
Traffic count	Stevens Creek Blvd: 4030 ADT (2009) Prado Vista Drive: 200 ADT (estimate) Foothill Blvd: 8960 ADT (2009) Silver Oak Lane: 500 ADT (estimate)
Groundcover	Gravel
Representative Area	San Jose-Sunnyvale-Santa Clara MSA

In October 2008, the Air District began particulate monitoring in Cupertino to determine if emissions from the nearby Lehigh Cement Plant and its associated diesel truck traffic could be producing elevated particulate concentrations in nearby neighborhoods. According to the 2010 census, the City of Cupertino has a population of 58,302.

The monitoring site was in a residential area just east of Permanente Canyon where the Lehigh Cement Plant is located. The site was also adjacent to Stevens Creek Boulevard which is the main route for truck traffic using the plant. Because cement plant and diesel truck emissions tend to produce larger-sized particles, a PM_{10} monitor was used to measure particulate impacts. A continuous monitor was used to correlate concentrations with the hourly emissions from the plant and the truck traffic.

During the period of operation, there were no measured PM_{10} concentrations above the national 24-hour PM_{10} standard of 150 $\mu g/m^3$. The monitor measured concentrations over the California 24-hour standard of 50 $\mu g/m^3$ on two days in 2008 and on one day in January 2010. However, particulate concentrations at most locations in the Bay Area were high on those days, so the high values may be due to basin-wide sources rather than local sources. Hourly particulate concentrations and wind data for the Cupertino site can be viewed on the Air District web site.

Monitoring ended in July 2010 when a new Cupertino monitoring site became operational at Monte Vista Park. Details about the Cupertino Monte Vista Park site can be found later in this section of the document.

Cupertino Monitor Information

Pollutant	Continuous PM10 BAM
Monitoring Objective	Population Oriented & Source Impact
Spatial scale	Neighborhood
Sampling method	Met One E-BAM
PM Filter Analysis method	N/A
Start date	10/29/08
Operation schedule	Continuous
Sampling season	All year
Probe height (AGL)	5.0 m
Probe height above roof	2.2 m
Distance from obstructions on roof	5.1 m
Distance from obstructions not on roof	32.3 m
Distance from tree (DL)	24.3 m
Distance to furnace or incinerator flue	15.9 m
Distance between collocated monitors	N/A
Distance between PM10 and PM2.5 samplers	N/A
Unrestricted airflow	360°
Probe material	N/A
Residence time	N/A
Will there be changes within the next 18 mos?	Site closed
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Every two weeks
Frequency of one-point QC check (gaseous)	N/A
Last Annual Performance Evaluation (gaseous)	N/A
Last two semi-annual flow rate audits for PM monitors	5/28/10

Cupertino Monte Vista Park

Site Name	Cupertino Monte Vista
AQS ID	06-085-2009
GIS coordinates	37.3184° N, 122.0697° W
Location	Trailer in parking lot
Address	22601 Voss Ave, Cupertino CA 95104
County	Santa Clara
Distance to road from gaseous probe	Foothill Blvd: 91 meters Voss Ave: 63 meters McKlintock Lane: 118 meters Woodbridge Ct: 70 meters
Traffic count	Foothill Blvd: 8,960 ADT (2009) Voss Ave: 1,000 ADT estimate McKlintock Lane: 200 ADT (estimate) Woodbridge Ct: 1,000 ADT (estimate)
Groundcover	Paved
Representative Area	San Jose-Sunnyvale-Santa Clara MSA

The Air District began a one year ambient air monitoring study in Cupertino on September 1, 2010. The purpose of the study is to determine the pollution impacts to local residents from vehicle traffic and the Lehigh Cement Plant located one mile west of the site. According to the 2010 census, the City of Cupertino has a population of 58,302. The Air District plans to close this station on August 31, 2011.

The mobile air monitoring station is located in Monte Vista Park. Although the purpose of the study is primarily source-oriented exposure from the cement plant and the associated truck traffic, the Air District is also monitoring population exposure to criteria pollutants including ozone, NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$, as well as toxics, metals, and mercury. An Air District meteorological system is also located in the park.

Ozone and its precursors (NO/NO_2) will be measured because the area is downwind of precursor sources during the warmer months. Carbon monoxide will be measured because of car and truck traffic on residential streets and because two freeways pass through Cupertino. SO_2 will be measured because the cement plant uses petroleum coke as fuel to heat the cement kiln. Continuous $PM_{2.5}$ and filter based PM_{10} will be measured because light winds combined with surface-based inversions during the winter months may cause elevated particulate levels. Hourly data collected is posted real-time on the Air District web site.

In 2011, the Air District will also measure ozone precursors CH_4/NMHC at Cupertino. These compounds were intended to be measured when the station opened but they require high pressure compressed hydrogen gas cylinders in order to operate. The gas cylinders were not permitted by the Santa Clara County Fire Department. As an alternate to compressed gas cylinders, new laboratory grade equipment was procured by the Air District. The new

equipment required extensive modification of the monitoring trailer thus delaying the start of CH_4/NMHC monitoring until April 1, 2011.

Gaseous toxic compounds and metals are sampled at Cupertino on a 1-in-6 day schedule. In 2010, gaseous toxic compounds were analyzed at the Air District laboratory and metals were analyzed by CARB. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report. Total Atmospheric Mercury is sampled for 24-hour periods on a 1-in-6 day schedule with laboratory analysis done by Frontier Geosciences. Toxic monitoring results, including mercury, are posted on a monthly basis on the Air District's website at:
http://www.baaqmd.gov/sitecore-s/~/media/Files/Technical%20Services/Cupertino_toxics.ashx

Since opening in September 2010, one exceedance of the national 8-hr ozone standard has been measured, but no exceedances of the national standards for PM_{10}, NO_2, SO_2 or CO have been measured. The continuous $PM_{2.5}$ (BAM) monitor recorded no concentrations above the national 24-hour $PM_{2.5}$ standard. However, this monitor is not a recognized FRM or FEM method, and the data cannot be used to determine violations of the national $PM_{2.5}$ standards, or its attainment status. Only FRM or FEM based $PM_{2.5}$ measurements may be used for comparison with national

Cupertino Monte Vista Monitor Information

Pollutant	O3	CO	NO/NO2	SO2
Monitoring Objective	Population Oriented & Source Impact	Population Oriented & Source Impact	Population Oriented & Source Impact	Population Oriented & Source Impact
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	TECO 49C	TECO 48I	TECO 42C	TECO 43C
PM filter analysis method	N/A	N/A	N/A	N/A
Start date	9/1/10	9/1/10	9/1/10	9/1/10
Operation schedule	Continuous	Continuous	Continuous	Continuous
Sampling season	All year	All year	All year	All year
Probe height (AGL)	4.6 m	4.6 m	4.6 m	4.6 m
Probe height above roof	2.0 m	2.0 m	2.0 m	2.0 m
Distance from obstructions on roof	None	None	None	None
Distance from obstructions not on roof	None	None	None	None
Distance from tree (DL)	5.2 m	5.2 m	5.2 m	5.2 m
Distance to furnace or incinerator flue	None	None	None	None
Distance between collocated monitors	N/A	N/A	N/A	N/A
Unrestricted airflow	360°	360°	360°	360°
Probe material	Teflon	Teflon	Teflon	Teflon
Residence time	13 s	14 s	15 s	15 s
Will there be changes within the next 18 mos?	Yes	Yes	Yes	Yes
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A
Frequency of flow rate verification for manual PM samplers	N/A	N/A	N/A	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	N/A	N/A	N/A
Frequency of one-point QC check (gaseous)	Every other day	Every other day	Every other day	Every other day
Last Annual Performance Evaluation (gaseous)	9/14/10	9/14/10	9/14/10	9/14/10
Last two semi-annual flow rate audits for PM monitors	N/A	N/A	N/A	N/A

Cupertino Monte Vista Monitor Information

Pollutant	PM10	Continuous PM2.5 BAM
Monitoring Objective	Population Oriented & Source Impact	Population Oriented & Source Impact
Spatial scale	Neighborhood	Neighborhood
Sampling method	Tisch Env. HiVol TE-6000	Met One BAM 1020
PM Filter Analysis method	Weighed by Air District	N/A
Start date	9/9/10	9/15/10
Operation schedule	1-in-6	Continuous
Sampling season	All year	All year
Probe height (AGL)	4.3 m	4.9 m
Probe height above roof	1.5 m	2.2 m
Distance from obstructions on roof	None	None
Distance from obstructions not on roof	None	None
Distance from tree (DL)	2 m	3 m
Distance to furnace or incinerator flue	None	None
Distance between collocated monitors	N/A	N/A
Distance between PM10 and PM2.5 samplers	PM10 to BAM: 2.4 m	BAM to PM10: 2.4 m
Unrestricted airflow	360°	360°
Probe material	N/A	N/A
Residence time	N/A	N/A
Will there be changes within the next 18 mos?	Yes	Yes
Is it suitable for comparison against the annual PM2.5?	N/A	No – not reference or equivalent method
Frequency of flow rate verification for manual PM samplers	Weekly	N/A
Frequency of flow rate verification for automated PM analyzers	N/A	Every two weeks
Frequency of one-point QC check (gaseous)	N/A	N/A
Last Annual Performance Evaluation (gaseous)	N/A	N/A
Last two semi-annual flow rate audits for PM monitors	12/14/10	12/14/10

Fort Cronkhite

Site Name	Fort Cronkhite
AQS ID	06-041-0004
GIS coordinates	37.832725° N, 122.527658° W
Location	At ground level behind a ranger residence
Address	Building 1111, Fort Cronkhite, Sausalito CA
County	Marin
Distance to road from probe	Bunker Road: 16 meters
Traffic count	Bunker Road: 948 ADT (2007)
Groundcover	Vegetative
Representative Area	San Francisco-Oakland-Fremont MSA

Fort Cronkhite was chosen for an air toxics monitoring site because it is representative of ambient levels of toxics compounds transported into the Bay Area along its western boundary. The site is ½ mile east of the Pacific Ocean, on the north side of the Golden Gate gap which opens into the San Francisco Bay. The monitor is located within the Golden Gate National Recreation Area (GGNRA) near the visitor center at Fort Cronkhite. Because winds in the Bay Area are generally from the west, this site is intended to be representative of local background toxics concentrations originating from the Pacific Ocean. The low concentrations from this site provide a baseline to which other toxics measurements in the Bay Area can be compared.

Toxics concentrations measured at this site should not be considered to be at pristine natural background levels. There are toxics contributions from emissions transported across the Pacific Ocean from Asia, from ships headed to and from Bay Area and Central Valley ports, and from ships sailing up and down the coast. Additionally, there can be a small contribution from vehicle traffic in areas upwind of the site within the GGNRA. In spite of these contributions, when winds are from the west, the toxics levels at this site reflect the lowest levels in the Bay Area.

The closest industrial sources are in San Francisco about eight miles southeast of the site. The closest towns are Sausalito, three miles to the east northeast with a population of 7,061, and Marin City, three miles to the northeast with a population of 2,666. Populations were based on the 2010 census. Sausalito and Marin City have little impact on the monitoring site because winds are typically from the west so the site is upwind of these towns, and the towns have no significant industrial sources.

This site is operated as part of the Air District's Toxics Program on a 1-in-12 day schedule. Samples are collected using a Xontech canister and later analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

Fort Cronkhite Monitor Information

Pollutant	Canister Toxics
Monitoring Objective	General Background
Spatial scale	Regional
Sampling method	Xontech 910A
PM filter analysis method	N/A
Start date	3/26/87
Operation schedule	1-in-12
Sampling season	All year
Probe height (AGL)	7.3 m
Probe height above roof	0.9 m
Distance from obstructions on roof	None
Distance from obstructions not on roof	None
Distance from tree (DL)	20 m
Distance to furnace or incinerator flue	N/A
Distance between collocated monitors	N/A
Unrestricted airflow	360°
Probe material	Teflon
Residence time	N/A
Will there be changes within the next 18 mos?	No
Is it suitable for comparison against the annual PM2.5?	N/A
Frequency of flow rate verification for manual PM samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check (gaseous)	N/A
Last Annual Performance Evaluation (gaseous)	N/A

Special Monitoring Programs Conducted in 2010

EPA School Air Toxics Monitoring Program

EPA established the School Air Toxics Monitoring Program (SATMP) in 2009 to understand whether outdoor toxic air pollution poses health concerns to schoolchildren. The program was planned on a national level and the field monitoring activities are being carried out by experienced state and local air monitoring agencies like the Air District under the supervision of EPA Regional Offices. The program seeks to determine if an air toxics exposure problem exists at schools and if so, pursue risk reduction activities and consider longer-term monitoring efforts where more information is needed. All samples were to be collected between June and September 2009. The Air District elected to extend the program, at its cost, through August 2010.

EPA developed a list of priority areas for an initial round of toxics monitoring. The priority areas were selected based on proximity to sources having a high toxicity potential. In the Bay Area, EPA had concerns about the impacts on nearby school children of hexavalent chromium emitted from the Lehigh Southwest Cement Plant in Cupertino. Studies in other parts of the country had shown that hexavalent chromium could be a significant air toxic released during cement manufacturing.

Daytime winds in Cupertino are generally from the north or northwest, which means the community is frequently upwind and away from impacts from the plant. However, there is potential for hexavalent chromium to reach the community whenever winds are from the south. There is also a local down-canyon wind pattern, which can occur at night, when surface winds travel from the plant down the Permanente Canyon toward Cupertino. The Stevens Creek Elementary School was chosen as a monitoring site because it is close to the Lehigh cement plant (1.6 km) and the entrance to Permanente Canyon. Figure 2 is a map showing the location of the school and the cement plant.

Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It commonly exists in trivalent (chromium III) or hexavalent (chromium VI) forms. While trivalent chromium is an essential nutrient that helps the body use fat, sugars, and protein, hexavalent chromium is a highly reactive, colorless, and odorless air toxic that can damage the respiratory system and cause cancer when inhaled at high concentrations.

Hexavalent chromium exists in the atmosphere as tiny particles or aerosols that are measured by drawing ambient air through a special filter for 24 hours on a 1-in-6 day schedule. Exposed filters are removed from the sampler by Air District staff and sent to ERG, a laboratory under contract to EPA/SATMP, for analysis within 30 days of collection. All sampling equipment, technician training, Standard Operating Procedures (SOPs), filters, and laboratory analysis services and procedures are provided directly by SATMP to maintain measurement uniformity and quality across the entire program.

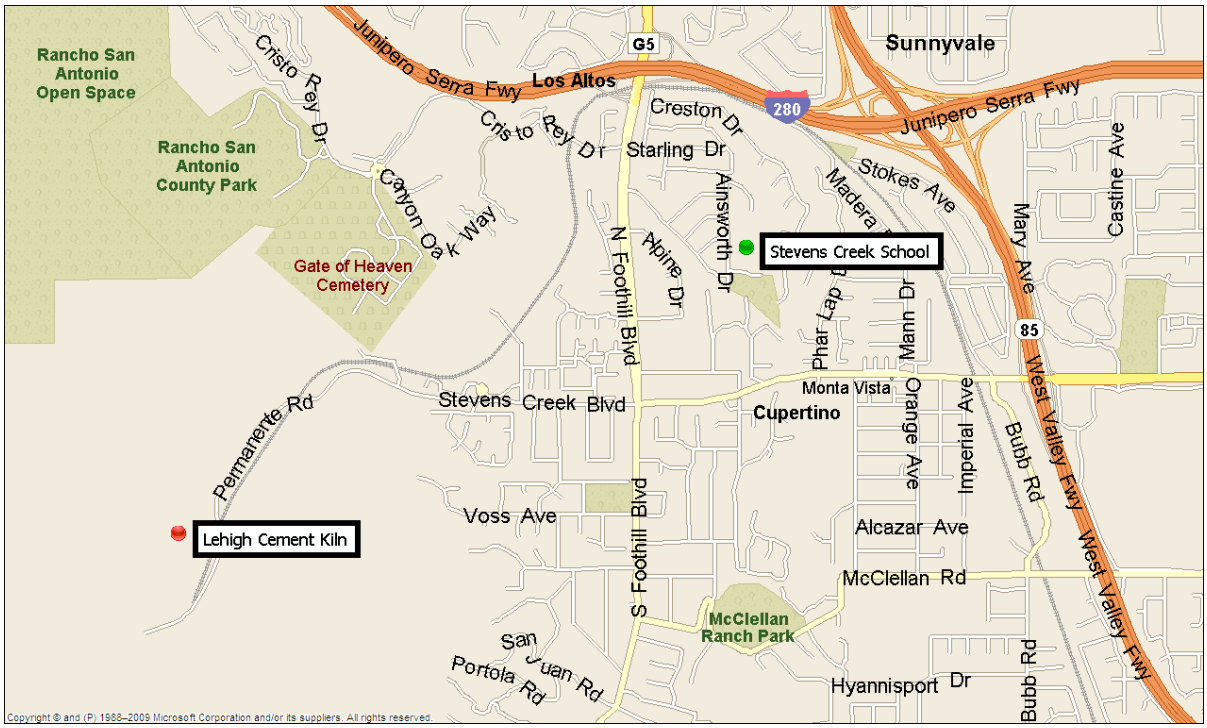

Figure 2. Map of Stevens Creek Elementary School in Cupertino.

The EPA sponsored SATMP Project at Stevens Creek Elementary School began in June 2009 and was completed in September 2009. As required by the project, ten primary samples were collected during the period. An additional three samples were also collected in case of possible primary sample invalidation. For the Cupertino site, all 13 samples were analyzed and validated, and all had concentrations that were well below levels of concern for cancer risk and respiratory exposure. Results and technical information for all SATMP monitoring locations are available at http://www.epa.gov/schoolair/schools.html. (Follow the navigation link to Stevens Creek Elementary School to view the most current monitoring data available for the school and an explanation of the results.)

Although the EPA sponsored SATMP sampling project ended in September 2009, the Air District continued the project at Stevens Creek School for an additional 11 months. The additional samples provided a more complete picture of hexavalent chromium concentrations at the school for an entire year. The extended sampling program was performed by Air District staff, and the Air District contracted with ERG to analyze the filters. All additional samples were analyzed and validated, and all had concentrations that were well below levels of concern for cancer risk and respiratory exposure. Results of the initial sampling and the extended Air District sampling were submitted to the EPA AQS database (AQS site number 06-085-5506) and may also be found at: http://www.epa.gov/cgi-bin/broker?_service=data&_program=dataprog.school_keydata.sas&site=060855506

Meteorology Program

The Air District operates a meteorological monitoring program to provide accurate measurements of ambient meteorological parameters to meet the requirements of many programs within the Air District, and to make these data available to the public. Air District programs which use meteorological data are: air quality forecasting, photochemical modeling, source modeling, and data analysis. To obtain high quality data that can be used for regulatory applications, the Air District follows EPA recommendations for siting, instrumentation, data accuracy, and quality assurance of the meteorological network.

The placement of meteorological stations depends on the use of the data. Sites chosen for air quality forecasting are located in areas that show the general wind and temperature patterns within the Air District. Photochemical modeling sites are chosen to show boundary conditions, general conditions, and upper air measurements. Source modeling sites are chosen to be representative of the source and receptor domain to be modeled. Sites used for data analysis are usually located near high pollution areas to determine the trajectories between source areas and downwind high concentration areas, as well as the general atmospheric conditions occurring during the episodes.

Because most Air District air monitoring stations are located in urban or suburban neighborhoods where multistory buildings and trees are nearby, it has not been possible to place meteorological systems at many of the Air District's air monitoring stations and still meet EPA meteorological siting recommendations. EPA recommends that wind systems be located at a height of 10 meters or at plume height if the use is source oriented modeling. In addition, the distance between the wind instrument and any obstruction should be at least 10 times the height of the obstruction.

The current meteorological network has 23 sites. Figure 3 shows the locations of the sites in 2010. Eight of these sites are located at or adjacent to air monitoring stations (Bethel Island, Cupertino Monte Vista Park, Suisun, Concord, Vallejo, Livermore, Gilroy, and San Martin). The other air monitoring stations have obstructions to air flow nearby, necessitating placement of the meteorological sites further away. Additionally, to meet forecasting or photochemical modeling needs, some meteorological sites have been placed on ridges or mountain tops, such as at Chabot, Mt. Tamalpais, and Kregor Peak.

Sensors used in the Air District's meteorological network are:

- Wind speed and direction (cup and vane).
- Temperature.
- Relative humidity (at some sites).
- Solar radiation (at some sites).
- Rainfall (at some sites).
- Ambient pressure (at one site).

Hourly-averaged data are made available to District staff and the public on the Air District's web page, and are archived in the Technical Service Division's database. An electronic report is generated daily that checks for out of range values, constant values, missing values,

or rate of change problems. If problems are seen, a technician visits the site to investigate. As part of the quality assurance program, each site is visited four times per year, twice for calibrations and twice for audits, and reports are generated for management review. At the end of each quarter, the data are reviewed and edited as needed. After editing, the data are uploaded into the EPA AQS database, and the preliminary data on the web page are overwritten with final data.

Data measured at airports and reported by the National Weather Service, as well as data from refineries as required under Air District regulations, from sewage treatment plants, from universities, and from private companies are also included in the Technical Services Division database as long as they meet EPA recommended siting and maintenance specifications. If requested by organizations, Air District staff will advised them where to best place their meteorological stations and how to operate the equipment such that the data can be used for regulatory purposes.

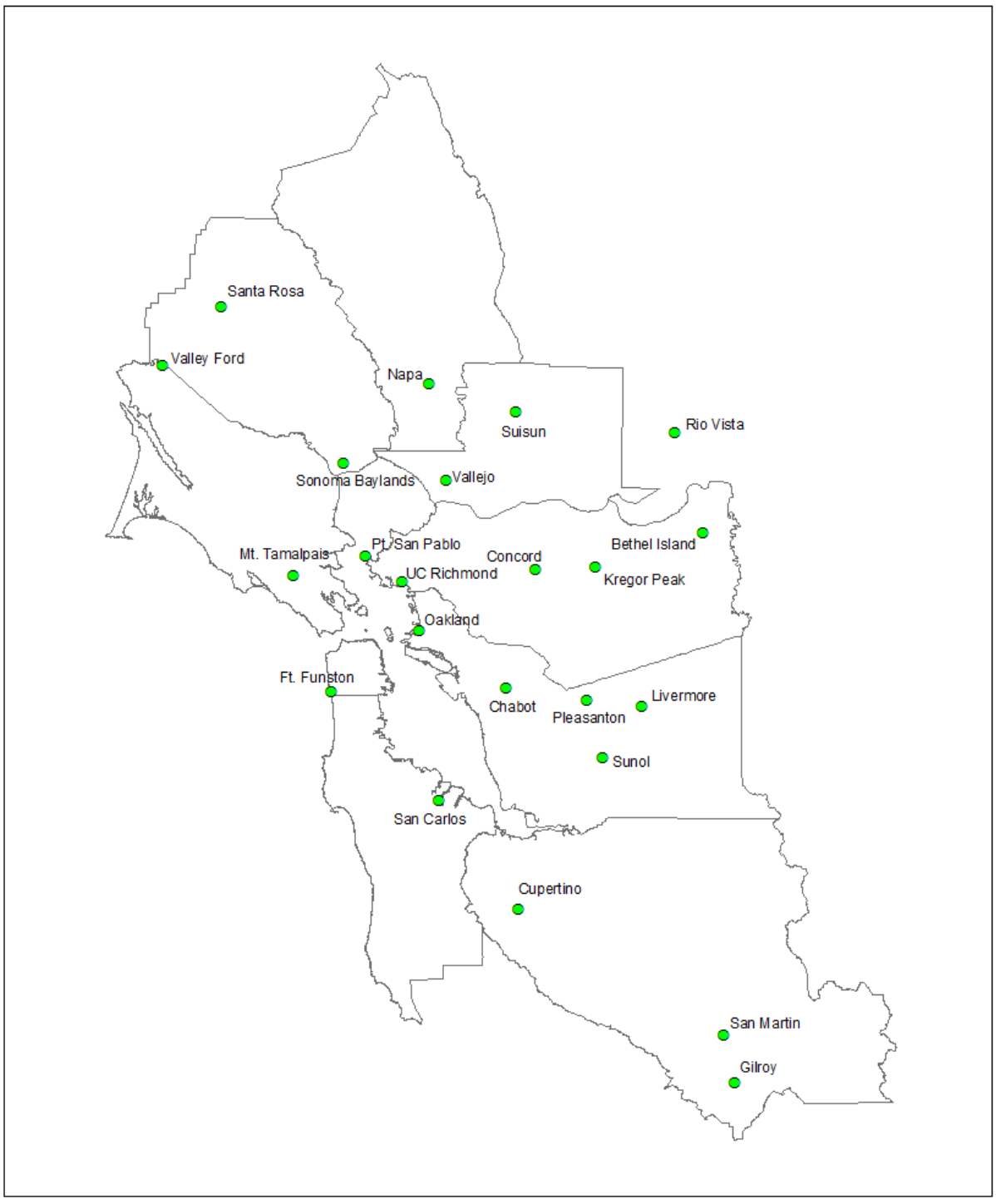

Figure 3. Map of Air District Meteorological Monitoring Sites for 2010.

National Air Toxics Trends Station (NATTS) at San Jose

EPA established the National Air Toxics Trends Stations (NATTS) network in 2003. NATTS was created to expand and improve national toxics monitoring with the major goal of identifying toxics trends in urban and rural settings throughout the United States. EPA and the Air District agreed to include San Jose in the NATTS network because of its history of high quality air toxics data back to 1991 (when canister sampling at San Jose began), and because San Jose is the largest city in Northern California with a 2010 population of 945,942. The Air District began operating a NATTS site at the San Jose air monitoring station on January 1, 2003. NATTS pollutants can be grouped into three categories: hazardous air pollutants, continuous measurements, and polycyclic aromatic hydrocarbons.

Hazardous Air Pollutants (HAPs) Measurements

The Clean Air Act Amendments of 1990 listed 188 HAPs of interest. Of these, EPA selected fifteen HAPs for trends analysis in the original 2003 NATTS monitoring program. These selections were based on toxicity, available measurement methods, cost of measurement, correlation with other important HAPs, and anticipated concentration levels. Table 10 lists the NATTS HAPs measured by the Air District along with the year NATTS measurements began. Hexavalent chromium is the only required NATTS airborne toxic compound that the Air District does not directly measure, because the current sampling methodology allows significant deterioration of the compound before the analysis can be performed. Chromium is measured instead as an estimate of hexavalent chromium concentrations. In the future, the Air District may sample for hexavalent chromium when better sampling techniques are developed.

Table 10. List of the 15 NATTS HAPs Monitored by the Air District.

Hazardous Air Pollutant or Species	Year NATTS Measurements Began	Parameter Type	Sample Source	Analyzing Lab	Analysis equipment
Benzene	2003	VOC	SUMMA canister	BAAQMD	GC
1, 3 Butadiene	2003	VOC	SUMMA canister	BAAQMD	GC
Carbon tetrachloride	2003	VOC	SUMMA canister	BAAQMD	GC
Chloroform	2003	VOC	SUMMA canister	BAAQMD	GC
Tetrachloroethylene	2003	VOC	SUMMA canister	BAAQMD	GC
Trichloroethylene	2003	VOC	SUMMA canister	BAAQMD	GC
Acrolein	2008	Carbonyl	SUMMA canister	BAAQMD	GC/MS
Formaldehyde	2006	Carbonyl	cartridge	BAAQMD	HPLC
Acetaldehyde	2006	Carbonyl	cartridge	BAAQMD	HPLC
Antimony	2008	metal	¼ PM10 filter[1]	ERG	ICPMS
Arsenic	2008	metal	¼ PM10 filter[1]	ERG	ICPMS
Cadmium	2008	metal	¼ PM10 filter[1]	ERG	ICPMS
Manganese	2008	metal	¼ PM10 filter[1]	ERG	ICPMS
Nickel	2008	metal	¼ PM10 filter[1]	ERG	ICPMS
Chromium[2]	2008	metal	¼ PM10 filter[1]	ERG	ICPMS

[1] PM_{10} Lo-Vol Teflon filter is sample source effective 12/22/10

[2] Chromium is measured as an estimate of hexavalent chromium.

Emission sources of the NATTS HAPs in Table 10 above:

- Benzene and 1, 3 butadiene are emitted by mobile sources (cars and trucks).
- Carbon tetrachloride, tetrachloroethylene and trichloroethylene are used for cleaning, but Air District regulations have significantly reduced their use.
- Chloroform is produced in the chlorination of water.
- Acrolein is generated by diesel and jet engines.
- Formaldehyde and acetaldehyde are formed during combustion processes. Formaldehyde is also created during the manufacture of some building materials and household products, and continues to off gas after manufacturing.
- Antimony comes from the soil.
- Arsenic compounds originate from soil and the smelting of metals.
- Nickel and cadmium compounds are naturally found in some soils and can be emitted from fossil fuel combustion, cement manufacturing and electroplating. Also, cadmium comes from tire wear.
- Manganese compounds naturally occur in some soils and can be emitted from steel plants, power plants and coke ovens.
- Hexavalent chromium is emitted during chrome plating operations, and is believed to be a byproduct of the cement-making process.

The Air District samples for the 14 NATTS pollutants and chromium on a 1-in-6 day schedule. Benzene; 1, 3 butadiene; acrolein; trichloroethylene; carbon tetrachloride; chloroform; and trichloroethylene are collected in canisters over a 24-hour period using a Xontech 910a sampler. The canister contents are then analyzed in the Air District laboratory using a Gas Chromatograph (GC) or a Gas Chromatograph/Mass Spectrometer (GC/MS). Formaldehyde and acetaldehyde (carbonyls) are collected using a cartridge on one sampling channel of a Xontech 924 toxics sampler. In the Air District laboratory, exposed cartridges are analyzed for carbonyls using High Performance Liquid Chromatograph (HPLC). During most of 2010, metals were collected on a standard PM_{10} filter. A quarter section of each filter was sent to ERG (EPA's designated contract laboratory) for analysis using Inductively Coupled Plasma Mass Spectrometry (ICPMS). With the implementation of the Lo-Vol collection method for PM_{10} in December 2010, a Teflon PM_{10} filter is sent to ERG for analysis.

Continuous Measurements

As part of the NATTS program, the Air District makes continuous measurements of CO. High sensitivity CO is measured as an analysis tool because of correlation to benzene and 1, 3 butadiene, two of the largest contributors to air toxic exposure.

Polycyclic Aromatic Hydrocarbons (PAHs) Measurements

In May 2008, the Air District began sampling for a number of PAHs under the NATTS program. PAHs are products of incomplete combustion, and are found primarily in soil, sediment and oily substances, as opposed to in water or air. However, they are also a component of concern in particulate matter in air and have probable human carcinogenic (cancer), mutagenic (genetic mutation), and taratogenic (birth defects) properties. The PAH compounds that the Air District measures are listed in Table 11.

Table 11. List of 22 NATTS PAH Compounds Measured by the Air District.

9-Fluorenone	Coronene
Acenaphthene	Cyclopenta(cd)pyrene
Acenaphthylene	Dibenz(a,h)anthracene
Anthracene	Fluoranthene
Benzo(a)anthracene	Fluorene
Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene
Benzo(b)fluoranthene	Naphthalene
Benzo(e)pyrene	Perylene
Benzo(g,h,i)perylene	Phenanthrene
Benzo(k)fluoranthene	Pyrene
Chrysene	Retene

The Air District does not have the equipment to meet the specific requirements to perform the analysis for these compounds, so ERG (EPA's designated contract laboratory) provides the filter media and analysis. PAH compounds are collected on a filter for a 24-hour period using a standard HiVol Polyurethane Foam (PUF) sampler on the NATTS 1-in-6 day sampling schedule. Filters are then sent to the ERG laboratory for analysis.

Summary NATTS data are available from the EPA's AirData web site at http://www.epa.gov/oar/data/index.html. These data may also be found on the BAAQMD web site in the Toxic Air Contaminant Control Program Annual Report at http://www.baaqmd.gov/Divisions/Engineering/Air-Toxics/Toxic-Air-Contaminant-Control-Program-Annual-Report.aspx.

In addition to the NATTS analytes discussed in this section, the Air District also samples for other toxics compounds at San Jose. These are discussed in the Toxics Program section of this report.

NCore Program

In October 2006 the EPA revised 40 CFR Parts 53 and 58 to enhance ambient air quality monitoring to improve air quality measurements. One significant revision was the requirement to establish National Core (NCore) multi-pollutant monitoring stations. These stations will provide data on several pollutants at lower detection limits and replace the National Air Monitoring Station (NAMS) networks that have existed for several years. NCore stations will also be used to monitor trends of pollutants already in attainment. EPA recognized that pollutants already in attainment, and likely to remain so, did not need to be measured at all sites in a monitoring network. NCore stations are to be located in areas which represent the highest pollution levels for both attainment and non-attainment pollutants within an agency's boundaries. By reducing the number of monitors needed in a network, agencies can allocate scarce resources to other monitoring programs.

NCore stations are intended to:

- Report data to the public in a timely manner through AirNOW, air quality forecasting, and other public reporting mechanisms.
- Support development of emissions control strategies through air quality model evaluation and other observational methods.
- Track long-term trends for accountability of emissions control programs and health assessments that contribute to ongoing reviews and attainment of the National Ambient Air Quality Standards (NAAQS).
- Support scientific studies ranging across technological, health, and atmospheric disciplines including ecosystem assessments.

EPA designed the national NCore network to have a mixture of urban and rural sites. In Northern California, EPA desired a monitoring station that would represent a large urban area. Recommendations for locating NCore urban sites are found in 40 CFR Part 58 Appendix D and other EPA publications:

- Urban NCore stations are to be located at neighborhood or urban scale to provide representative exposure levels throughout the metropolitan area population.
- Urban NCore stations should be located where significant pollution levels exist.
- Population oriented monitoring is highly recommended.
- No biasing local pollutant emission sources should be within 500 meters at urban stations.
- Collocation with other network programs (such as NATTS, STN, CASTNET, IMPROVE, NADP, PAMS) is encouraged.
- Siting of monitors at NCore sites must meet SLAMS requirements as specified in 40 CFR Part 58.

EPA and the Air District cooperatively agreed to establish the Northern California NCore station in San Jose. EPA will provide funding and the Air District will operate the station. The station is operational as of January 1, 2011. The city of San Jose was chosen as the NCore site because it is the largest city in the Bay Area with over one million residents. Exceedances of both the ozone and 24-hour $PM_{2.5}$ national standards have been measured in

San Jose. Consequently, operating an NCore station in the San Jose area would meet the requirement of being in an urban area with significant air pollution problems.

San Jose is located in the southern part of the Bay Area, and lies within the Santa Clara Valley. Wind patterns in the Santa Clara Valley are influenced greatly by the terrain, resulting in a prevailing flow roughly parallel to the valley's northwest-southeast orientation. During the daytime a sea breeze commonly carries pollutants from San Francisco, San Mateo and Alameda counties southward into the Santa Clara Valley, while a drainage flow carrying pollutants toward the bay, in the opposite direction, occurs during the nighttime hours. This diurnal up valley and down valley air flow mixes pollutants throughout the valley, making San Jose representative of a large part of the Bay Area.

The monitoring objective for the current San Jose air quality monitoring station is population exposure. Monitoring at a population-oriented station is intended to represent air quality levels over a large area having a high population density. Consequently, the site cannot be too close to large emission sources such as industrial sources or highways, and the surrounding land use should be relatively uniform. EPA has defined neighborhood or urban scale as the appropriate area of representativeness for population oriented monitoring. Neighborhood scale has dimensions of 4 km around the monitoring station, and urban scale has a 50 km radius. Figure 4 shows the location of the current San Jose monitoring station (as a blue balloon), and a 4 km circle around the site representing a neighborhood scale area.

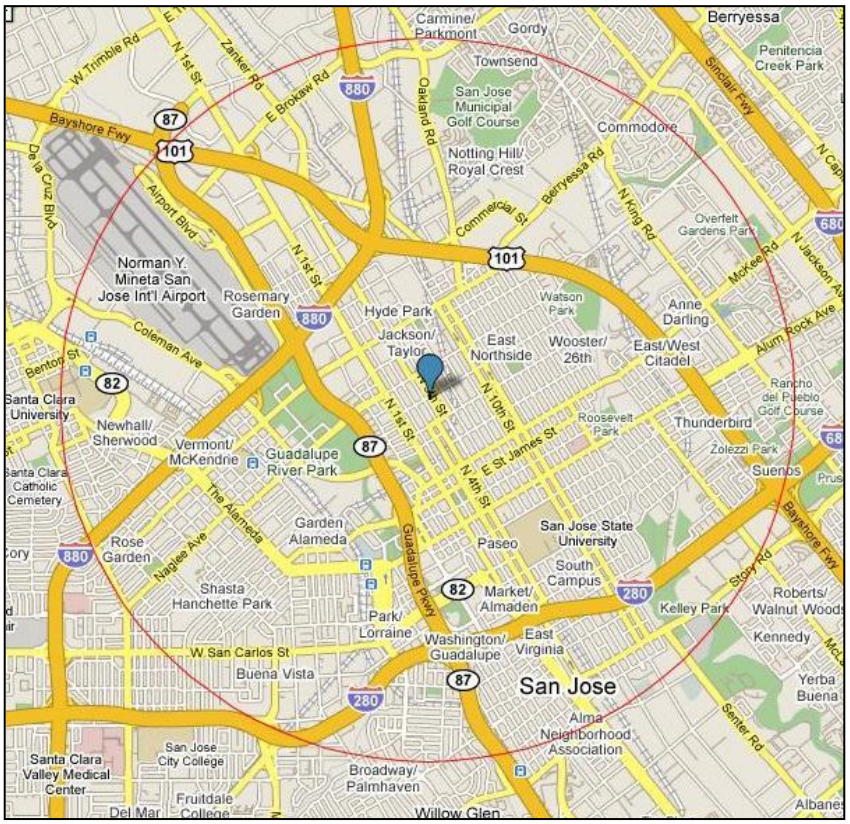

Figure 4. Map showing area of Neighborhood Scale at the San Jose NCore station.

The map shows that the current station is located in a residential/commercial area of San Jose. The station is located on Jackson Street, 1.6 km NW of the downtown core. The Air District has operated air monitoring stations at various locations near downtown San Jose since 1968, and current station has been in operation since 2002. The downtown area is encircled by freeways, but the closest freeway to the air monitoring station is 800 meters to the WSW, which is sufficiently distant to prevent vehicular emissions from dominating the general air quality at the San Jose station. The San Jose Airport is 2 to 4 km from the air monitoring station, distant enough that impacts from airport emissions would be relatively low at the monitoring station. There are no large point sources within 500 meters of the station. The only significant emission sources within a 4 km radius of the San Jose air monitoring station are:

- The Norman Y. Mineta San José International Airport, located from 2-4 km NW of the site, is a significant source. The airport averaged 256 commercial and 141 general aviation departures and landings per day in 2008.
- Reed & Graham, Inc. (an asphalt batch plant) - located 3.7 km SSW of the site.
- Central Concrete Supply Company, Inc. - located 1.9 km SSW of the site.
- San Jose State University Cogeneration Plant - located 2.6 km SSE of the site.

The San Jose air monitoring station was located to provide air quality data representative of neighborhood scale monitoring. The station currently monitors all criteria pollutants, toxics, and is part of the EPA NATTS and STN programs. This existing station meets all the site selection criteria for an NCore station.

NCore Monitors

Table 12 lists the NCore monitors operating at the San Jose station as well as the sampling methodology, sampling frequency and spatial scale for the monitors. Because ambient concentrations of the criteria pollutants CO and SO_2 are well below the NAAQS at population oriented sites across the U.S., EPA requires NCore sites to use higher sensitivity instruments than conventional instruments for these pollutants (note the use of TLE type instruments for CO and sulfur dioxide, meaning Trace Level-Enhanced). $PM_{10-2.5}$ is measured using the difference between measurements of a pair of Partisol-Plus Model 2025 Sequential samplers, with one configured as a $PM_{2.5}$ sampler and the other configured as a PM_{10} sampler. Lead is collected using the PM_{10} Teflon filter, which is sent to ERG (EPA's designated contract laboratory) for analysis using Inductively Coupled Plasma Mass Spectrometry (ICPMS).

Table 12. NCore Monitors

Monitor Type	Sampling Method	Sampling Frequency	Spatial Scale
Carbon Monoxide (CO)	TECO 48i TLE	Continuously	Neighborhood
Nitrogen Oxide (NO_x)	TECO 42C	Continuously	Neighborhood
Ozone (O_3)	TECO 49i	Continuously	Neighborhood
Sulfur Dioxide (SO_2)	TECO 43i TLE	Continuously	Neighborhood
FRM $PM_{2.5}$	Partisol-Plus 2025 w/VSCC	Apr-Sep: 1-in-3 day Oct-Mar: Daily	Neighborhood
BAM $PM_{2.5}$	Met One Model 1020	Continuously	Neighborhood
$PM_{2.5}$ Speciation	Met One SASS	1-in-3 day	Neighborhood
Total Reactive Nitrogen (NO_y)	API 200EU	Continuously	Neighborhood
$PM_{10\text{-}2.5}$	Partisol-Plus 2025 Sequential $PM_{10\text{-}2.5}$ Air Sampler Pair	1-in-3 day	Neighborhood
Lead	PM_{10} Teflon filter analyzed by ERG using XRF	1-in-3 day	Neighborhood
Meteorological	EPA approved a waiver to use meteorological data from the San Jose Airport as official data for the NCore site.	Continuously	N.A.

Photochemical Assessment Monitoring Stations (PAMS)

The 1990 Clean Air Act Amendments required EPA to promulgate rules for the enhanced monitoring of ozone and its precursors (NOx and VOCs) because of continued nonattainment of the National Ambient Air Quality Standard (NAAQS) for ozone nationwide. Subsequent revisions to EPA's Air Monitoring regulations, 40 CFR Part 58, required air pollution agencies to establish Photochemical Assessment Monitoring Stations (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme. The Bay Area is not in any of these categories, but is in marginal nonattainment of the ozone NAAQS. Consequently, the Air District applied for and received funding from EPA to conduct measurements of VOC speciated hydrocarbons. Monitoring began in 2010 and will continue for at least three years.

The objectives of the Bay Area PAMS program are to:

- Measure air quality improvement progress
- Track emission trends
- Improve photochemical model performance
- Adjust ozone control strategies

Traditionally, summertime Bay Area ozone concentrations are highest in the Livermore and Santa Clara Valleys. Meteorological conditions are ideal for ozone formation in these areas when precursor NOx and hydrocarbons are present in upwind areas. To better understand the atmospheric chemistry, emissions sources, emission reductions strategies, and pollutant transport, three locations in the Livermore area will monitor for speciated hydrocarbons. Each PAMS site will also have meteorological wind and temperature sensors.

Site	Parameter	Start Date for PAMS Data Collection
Livermore	Air Monitoring	August 1, 2010
	Meteorology	August 1, 2010
San Ramon	Air Monitoring	July 2011 (approx.)
	Meteorology	July 2011 (approx.)
Patterson Pass	Air Monitoring	March 1, 2011
	Meteorology	Late Summer 2011 (approx.)

The Air District's Livermore air monitoring station was selected as a PAMS site because Livermore usually has the most number of days per year exceeding the ozone NAAQS in the Bay Area. The Livermore site also has meteorological sensors measuring wind, temperature, and solar radiation and the site already has instruments measuring NOx and ozone. As a result, the cost to add speciated hydrocarbon monitoring at Livermore was minimal.

The San Ramon and Patterson Pass sites are new, temporary sites that are being opened solely for the PAMS program. The San Ramon PAMS will provide information on ozone precursors and ozone formation in the San Ramon Valley that may contribute to ozone concentrations in the Livermore Valley. While the EPA provided funding for speciated hydrocarbon monitoring at San Ramon, the Air District is adding ozone and NOx so that data from this site can be compared to data collected at Livermore. This site may become a permanent location for ozone and NOx monitoring if these pollutants frequently exceed the

NAAQS. The Patterson Pass site is located in the hills east of Livermore and will provide additional information on the potential transport of ozone precursor compounds eastward from the Bay Area to the Central Valley. EPA funded speciated hydrocarbon monitoring and the Air District added a NOx monitor at this site. The three PAMS locations are shown in Figure 5.

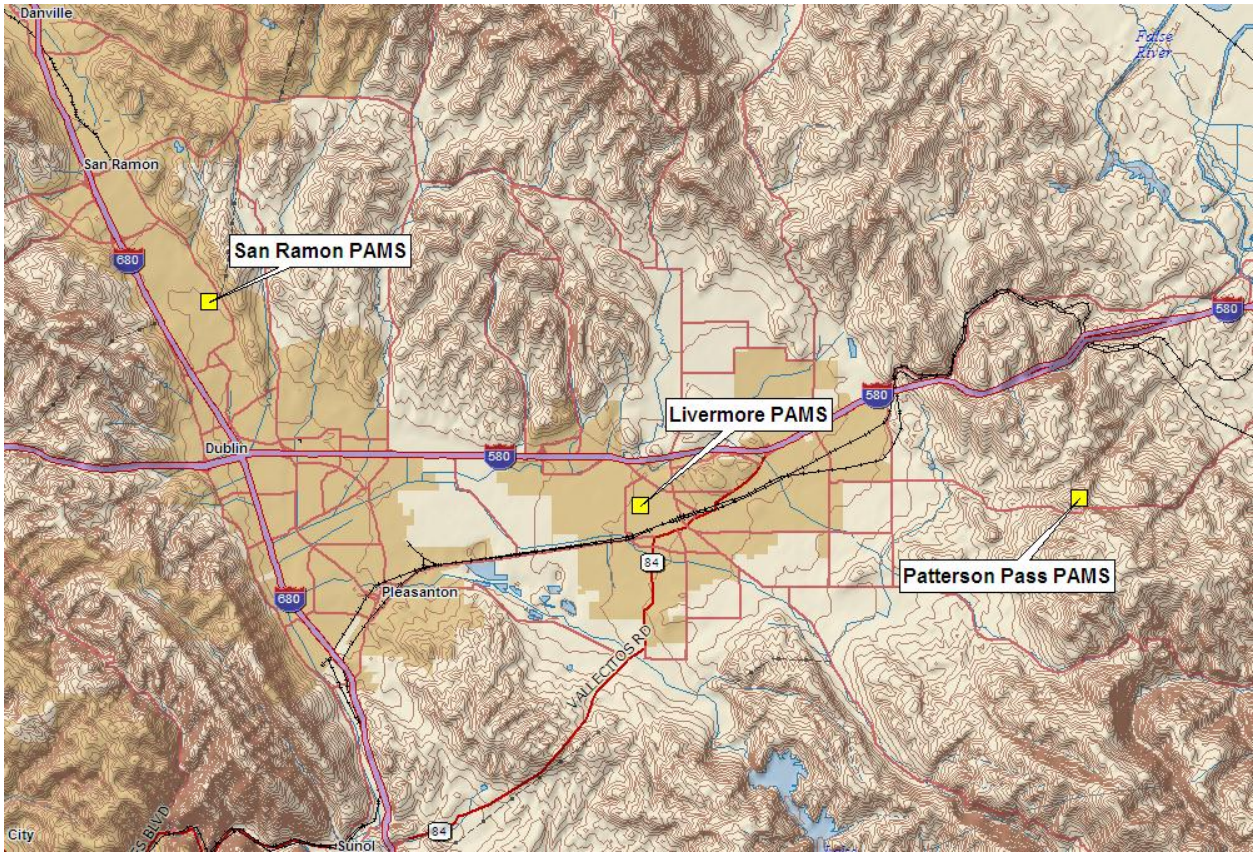

Figure 5. Map of the three PAMS sites in the Livermore Valley.

EPA identifies 57 organic ozone precursor compounds usually measured at PAMS locations because of their significance in photochemical ozone pollution. The Air District will measure 55 of the 57 compounds hourly using a gas chromatograph (GC) instrument. The GC does not analyze for two compounds EPA considers important ozone precursors: formaldehyde and acetone. The Air District determined that it was too costly to measure these compounds hourly. Table 13 below lists the 55 compounds measured by the GC.

Table 13. List of speciated hydrocarbons measured by Gas Chromatograph

Ethane	n-decane	2-methylheptane
Ethylene	Cyclopentane	m/p xylene
Propane	Isoprene	Benzene
Propylene	2-2-dimethylbutane	Toluene
Acetylene	1-hexene	Ethylbenzene
n-butane	2-4-dimethylpentane	o-xylene
Isobutane	Cyclohexane	1-3-5-trimethylbenzene
t-2-butene	3-methylhexane	1-2-4-trimethylbenzene
c-2-butene	2-2-4-trimethylpentane	n-propylbenzene
n-pentane	2-3-4-trimethylpentane	Isopropylbenzene
Isopentane	3-methylheptane	o-ethyltoluene
1-pentene	Methylcyclohexane	m-ethyltoluene
t-2-pentene	Methylcyclopentane	p-ethyltoluene
c-2-pentene	2-methylhexane	m-diethylbenzene
3-methylpentane	1-butene	p-diethylbenzene
n-hexane	2-3-dimethylbutane	Styrene
n-heptane	2-methylpentane	1-2-3-trimethylbenzene
n-octane	2-3-dimethylpentane	
n-nonane	n-undecane	

The GCs will operate year-round which is a deviation from EPA protocols that only require these measurements during ozone episodes. Year-round measurements are desired because the same hydrocarbons that lead to high ozone in summer also contribute to secondary formation of particulate pollution in winter.

All ozone, NOx, and speciated hydrocarbon data are submitted to EPA's AQS database. When enough data is collected to yield a better understanding of emissions and photochemical processes in the Livermore area, the Air District will evaluate whether instrumentation should be moved to the Santa Clara Valley for a similar PAMS program.

$PM_{2.5}$ Speciation Sampling Programs

EPA established a fine particulate ($PM_{2.5}$) standard in 1997 and required States to install and operate new $PM_{2.5}$ samplers to determine where the national ambient $PM_{2.5}$ air standards are not being met. As part of the $PM_{2.5}$ monitoring program, EPA also established a network of speciation monitors at sites expected to exceed the $PM_{2.5}$ standard. The primary purpose of the speciation monitors is to provide a chemical composition of the particulate matter which will point to the emission sources. This network is known as the Speciation Trends Network (STN).

A $PM_{2.5}$ sampler was installed at the San Jose air monitoring station in January 1999 and the first year of data showed exceedances of the national standard. Consequently, EPA requested that a Met One Spiral Ambient Speciation Sampler (SASS) sampler be installed at San Jose in early 2000 as part of the STN network. Exceedances of the $PM_{2.5}$ national standard have also been recorded at other Bay Area sites, and in 2008 the Air District added SASS samplers at Vallejo and Livermore. In 2009 the Air District added a SASS sampler at the new Oakland West air monitoring station. Knowing the chemical composition of particulates on days over the standard at four Bay Area sites will help determine which emission reduction strategies will most likely lead to attainment of the national standard.

Speciation Trends Network (STN) Program

STN sites have the primary objective of defining long-term concentration trends of the elements, ions, and organic and elemental carbon components that make up $PM_{2.5}$ particles. San Jose was chosen as an STN station because it was already collecting $PM_{2.5}$ mass, has recorded exceedances of the $PM_{2.5}$ standard, and is the largest city in Northern California.

$PM_{2.5}$ samples are collected using a SASS sampler. The sampler operates from midnight to midnight of the next day, and samples are on a 1-in-3 day schedule. In addition to the SASS, there is an FRM $PM_{2.5}$ filter sampler used to measure the total mass of $PM_{2.5}$ and to determine when exceedances of the $PM_{2.5}$ standard occur. In 2010, the FRM sampling was on a 1-in-6 day schedule in the summer and daily in the winter. In 2011, the FRM summer sampling frequency will change to a 1-in-3 day schedule. SASS sampling is scheduled to coincide with FRM sampling days so that speciation information can be used to help identify sources and develop effective control strategies.

The SASS samplers draw air through size-selective nozzles that exclude particles greater than 2.5 microns. SASS samplers uses Teflon, nylon and quartz filters upon which to collect the samples, which are later weighed using a mass balance and analyzed using energy-dispersive X-ray fluorescence, ion chromatography, and thermal/optical analysis techniques to measure the components. The San Jose filter analysis is done by RTI, an EPA contract laboratory in North Carolina. Sixty-two chemical species listed in Table 14 are measured from each SASS filter sample at RTI. The San Jose data are then submitted to the EPA AQS database by RTI, and can be viewed on the EPA's AirData web site at http://www.epa.gov/oar/data/index.html.

BAAQMD Supplemental Speciation Network Program

The Air District also operates SASS samplers at its stations in Vallejo, Livermore, and Oakland West. Vallejo and Livermore were selected for sampling because there was an interest in determining the source of $PM_{2.5}$ particles on days that exceed the standard at those sites. These sites may have a different $PM_{2.5}$ composition from that of San Jose because exceedances often occur on days when the air flow is from the Central Valley. Oakland West was selected because it is downwind of the Port of Oakland, a major source of diesel particulate matter. The samplers, sampling procedures, analysis techniques and species analyzed are the same as for the STN program with the following exceptions: the collection frequency is 1-in-6 days; DRI provides the filters, does the analysis and submits the data to AQS; and filters from these sites also are analyzed for palladium, thallium and uranium. Data from the 65 chemical species listed in Table 14 can be viewed on the EPA's AirData web site at http://www.epa.gov/oar/data/index.html.

The table is color coded with green (the first 13 rows) listing elements, blue (the next two rows) listing anions and cations, and yellow (the next eight rows) listing organic and elemental carbon types.

Table 14. $PM_{2.5}$ Speciation Measurements at Air District Sites.

Antimony	Cesium	Magnesium	Sodium
Arsenic	Europium	Mercury	Strontium
Aluminum	Gallium	Nickel	Sulfur
Barium	Gold	Niobium	Tantalum
Bromine	Hafnium	Phosphorous	Terbium
Cadmium	Iron	Potassium	Tin
Calcium	Indium	Rubidium	Titanium
Chromium	Iridium	Samarium	Tungsten
Cobalt	Lanthanum	Scandium	Vanadium
Copper	Lead	Selenium	Yttrium
Chlorine	Manganese	Silicon	Zinc
Cerium	Molybdenum	Silver	Zirconium
Palladium[1]	Thallium[1]	Uranium[1]	
Ammonium Cation	Chloride Anion	Potassium Cation	Nitrate Anion
Sodium Cation	Sulfate Anion		
Total Organic Carbon (sum of the OC Fractions below)			
Elemental Carbon Fraction 1 (carbon released at 550ºC in 10% oxygen/90% helium gas)			
Elemental Carbon Fraction 2 (carbon released at 700ºC in 10% oxygen/90% helium gas)			
Elemental Carbon Fraction 3 (carbon released at 800ºC in 10% oxygen/90% helium gas)			
Organic Carbon Fraction 1 (carbon released at 120ºC in helium gas)			
Organic Carbon Fraction 2 (carbon released at 250ºC in helium gas)			
Organic Carbon Fraction 3 (carbon released at 450ºC in helium gas)			
Organic Carbon Fraction 4 (carbon released at 550ºC in helium gas)			

[1] Elements measured only at Vallejo, Livermore, and Oakland West.

Toxics Program

The Clean Air Act Amendments of 1990 required EPA to set emission standards for major sources of Hazardous Air Pollutants (HAPs). The Act also required EPA to assess the risks to human health from HAPs. By 2010 EPA had listed 187 compounds as HAPs. All HAPs listed by EPA are known to cause or are suspected of causing cancer, birth defects, reproduction problems, and other serious illnesses. Exposure time to certain levels of some HAPs can cause difficulty in breathing, nausea or other illnesses and can even cause death.

Toxic pollutants (HAPs) are emitted daily by industrial and chemical manufacturing processes, commercial activities, refinery operations, gasoline marketing and motor vehicles within the Bay Area. Ambient concentrations vary by proximity to sources and current meteorological conditions.

The Air District established an ambient air toxics monitoring program with the objectives of:

- Establishing trends and evaluating the effectiveness of HAP reduction strategies.
- Characterizing ambient concentrations in local areas.
- Providing data to support and evaluate dispersion and deposition models.
- Providing data to the scientific community to support studies to reduce uncertainty about the relationships between ambient levels of HAPs, actual human exposure to air toxics, and health effects from such exposures.

Figure 6 is a map of the 20 toxics monitoring sites operating in 2010. Locations are at existing Air District SLAMS and SPM monitoring stations and were selected to obtain a wide geographical coverage of contaminant levels throughout the Bay Area. The sites are generally located in major population centers or downwind of major industrial sources such as refineries. There is also an ambient background site at Fort Cronkhite. The toxics data collected at San Jose are also reported to EPA as part of the NATTS program. Toxics monitoring at Fremont ended on July 19, 2010.

Air samples are collected at Air District toxics monitoring sites for a 24 hour period on a 1-in-12 day schedule except at special study sites such as Berkeley, Cupertino, and San Jose where sampling is on a 1-in-6 day schedule as described later in this section. A 1-in-12 day schedule allows samples to be taken on a different day of the week over the course of months. This is the same schedule EPA and CARB use for their toxics monitoring program, thereby allowing Bay Area toxics concentrations to be compared to concentrations measured elsewhere across the country.

Gaseous (VOC) toxics are collected in 6-liter SUMMA stainless steel canisters using Xontech 910 samplers. The sampler continuously collects an ambient air sample for 24-hours to ensure capturing transient and intermittent toxic releases. All canisters are analyzed within 30 days of sample collection using capillary gas chromatography employing photoionization and electron capture detectors.

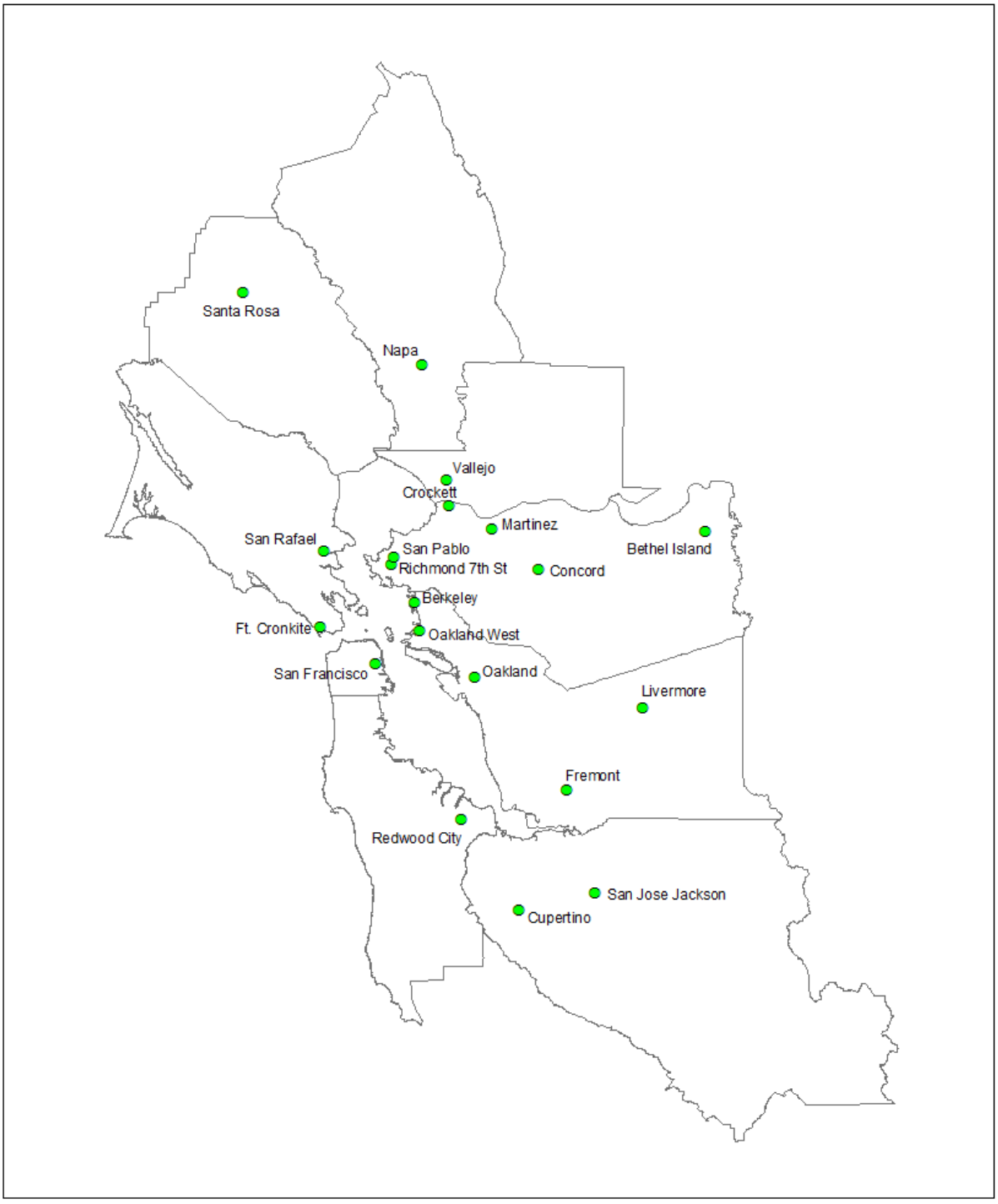

Figure 6. Map of Air District Toxics Monitoring Sites for 2010.

In 1986, the toxics monitoring network used Tedlar bags to collect the ambient air samples, which were filled using an Air District designed and constructed sampler. This methodology had several problems including leaks, contamination, and the requirement to perform the laboratory analysis within 48 hours of sample collection. Between 1991 and 1997, the Air District phased in an improved sampling methodology, using a 6-liter SUMMA stainless steel canister to replace the Tedlar bags, and replacing the Air District sampler with a commercially available Xontech sampler. This was the same system that CARB had been successfully using for a few years. This method also allowed canister contents to be analyzed up to 30 days after sample collection. It also provided more flexibility in scheduling sample days, conducting the laboratory analysis, and for transportation of the samples. The data collected after the switch to SUMMA canisters is considered to be of higher quality than data collected with Tedlar bags.

Both the Air District and CARB have toxic monitoring programs in the Bay Area. CARB conducts toxic monitoring on a 1-in-12 day schedule at three sites: San Francisco, San Jose, and Fremont. CARB supplies the canisters and performs the laboratory analyses, while Air District staff operates the CARB sampler and ships the canisters to CARB. Because the Air District also does toxics monitoring at San Francisco and San Jose, the two sets of data allow calculation of the measurement precision at these sites, and by extrapolation, an estimate of the precision of the toxics measurement program. CARB discontinued its toxic monitoring program at Fremont in July 2010 because the Air District was in the processes of closing the Fremont station in the fall.

Once a quarter at San Francisco, an additional canister sample is taken on a scheduled sample day using a collocated sampler. Both samples are analyzed by the Air District laboratory, and the results allow an additional measure of precision.

The Air District laboratory analyzes for the 19 gaseous toxic compounds listed in Table 15. Compounds selected for analysis were those that had high toxicity or were known to have high emissions in the Bay Area, or some combination of the two. Another consideration was whether the current methodology could accurately detect a compound at reasonable expense, based on previous CARB studies. Some compounds, such as carbon tetrachloride, are measured because their concentration in the ambient air does not change much over time. This is useful because carbon tetrachloride or other similar, stable compounds can be used as a control for quality purposes. If the measurement of such a control is unusually high or low, there may be a problem in the sampling, transport, storage or analysis procedures requiring additional analysis of the accuracy of the affected sample.

Table 15. List of Toxic Compounds Measured by the Air District in 2010.

Acetone	Methyl Ethyl Ketone
Benzene	Methylene Chloride
1, 3 Butadiene	M/P Xylene
Carbon Tetrachloride	Perchloroethylene
Chloroform	1,1,2 Trichlorotrifluoroethane
Ethylbenzene	Trichloroethylene
Ethylene Dibromide	Trichlorofluoromethane
Ethylene Dichloride	Toluene
O-Xylene	Vinyl Chloride
Methyl Chloroform	

In addition to the gaseous toxics monitoring done across the Bay Area, the Air District does monitoring for polycyclic aromatic hydrocarbons, metals, and aldehydes at San Jose for the NATTS program. See the NATTS section of this document for more information about the NATTS program.

Toxics Monitoring at Berkeley and Cupertino

In 2010, the Air District operated a Xontech 910 sampler to collect toxic samples in canisters at the SPM monitoring sites in Berkeley and Cupertino on a 1-in-6 day schedule. In addition to the compounds listed in Table 14, there was interest in measuring formaldehyde and acetaldehyde at Berkeley and Cupertino. These compounds are highly reactive and cannot be accurately measured using a canister sample. Instead, they are collected on a chemically treated cartridge using a Xontech 924 sampler, operated on the same 1-in-6 day schedule as the Xontech 910 used for sample collection in canisters. Samples are analyzed at the Air District laboratory using High Performance Liquid Chromatography.

At Berkeley, the Xontech 924 sampler was also used to collect metals on Teflon filters on the same 1-in-6 day schedule used for other toxics sampling. Samples are analyzed by CARB using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The Berkeley site was closed on December 31, 2010 after the three year monitoring program concluded. The metals analyzed for are listed in Table 16.

Table 16. Metals measured at Berkeley using ICP-MS

Antimony	Lead	Sulfur
Arsenic	Manganese	Tin
Cadmium	Molybdenum	Titanium
Chromium	Nickel	Vanadium
Cobalt	Platinum	Zinc
Copper	Selenium	Zirconium
Iron	Strontium	

At Cupertino, the Xontech 924 sampler was used to collect metals on Teflon filters on the same 1-in-6 day schedule used for other toxics sampling. Samples are analyzed by CARB using X-Ray Fluorescence Spectrometry (XRF). The metals analyzed for are listed in Table 17. Results are posted on the BAAQMD web site at:
http://www.baaqmd.gov/sitecore-s/~/media/Files/Technical%20Services/Cupertino_toxics.ashx

Table 17. Metals measured at Cupertino using XRF

Aluminium	Chromium	Molybdenum	Strontium
Antimony	Cobalt	Nickel	Sulfur
Arsenic	Copper	Phosphorus	Tin
Barium	Iron	Potassium	Titanium
Bromine	Lead	Rubidium	Vanddium
Calcium	Manganese	Selenium	Yttrium
Chlorine	Mercury	Silicon	Zinc

In addition to CARB's measurement of metals, the Air District laboratory began measuring the metals listed in Table 16 in January 2011. The analysis is done using XRF on the same samples that CARB analyzes to compare results. The measurements from both agencies have been comparable and, consequently, the Air District plans to discontinue the CARB analysis starting with samples collected in April 2011.

Additional Mercury Monitoring at Cupertino Monte Vista Park

Due to public concern about mercury emissions from the nearby Lehigh Southwest Cement Plant in Cupertino, the Air District began monitoring for Total Atmospheric Mercury (TAMS) at the Cupertino Monte Vista Park site on September 11, 2010.

Total atmospheric mercury includes both vapor and particulate forms of mercury whereas mercury measured on a filter using XRF methods yields solely the particulate form of mercury. Total atmospheric mercury is collected on a carbon trap using a Xontech 924 sampler on the same 1-in-6 day schedule as the particulate mercury collected on Teflon filters. The carbon trap is analyzed by Frontier Geosciences. Results are posted on the BAAQMD web site at:
http://www.baaqmd.gov/sitecore-s/~/media/Files/Technical%20Services/Cupertino_toxics.ashx

Additional Gaseous Toxics Measured at San Jose

At San Jose the Air District analyzed for additional gaseous toxics compounds from the canisters. Acrolein is measured because San Jose is a NATTS program monitoring site and the NATTS program requires acrolein to be measured. The Air District uses a gas chromatography mass spectrometry method to measure acrolein. This method allows detection of three other toxic compounds: acetonitrile, acrylonitrile, and ethanol. Acrylonitrile is measured because CARB wanted measurements to compare with other parts of the State. Ethanol is measured because researchers at UC Berkeley wanted to compare ethanol measurements taken near the Caldecott Tunnel with those taken from other areas of

the Bay Area. Finally, acetonitrile is measured because it is a related compound and there were no other measurements of this compound in the Bay Area.

Additional Gaseous Toxics monitoring in 2011 at all sites

A modern gas chromatography mass spectrometry instrument was purchased by the Air District in late 2009 and installed in mid-2010. The Air District intends to measure Acrolein, Acetonitrile, Acroylonitrile, and Ethanol from all canister samples from the new instrument. However, testing found that the instrument failed to yield comparable results for multiple analyses done from the same canister sample. As of mid-2011, troubleshooting and retesting in consultation with the manufacturer continues, but a solution must be found before the Air District can start to measure these additional compounds from all canister samples.

Summary toxics data are available from the EPA's AirData web site at http://www.epa.gov/oar/data/index.html. These data may also be found on the BAAQMD web site in the Toxic Air Contaminant Control Program Annual Report at http://www.baaqmd.gov/Divisions/Engineering/Air-Toxics/Toxic-Air-Contaminant-Control-Program-Annual-Report.aspx.

West Oakland CASS Study

The Air District is conducting an ambient air sampling and modeling study in the area near the Custom Alloy Scrap Sales (CASS) metals recycling facility in West Oakland. The purpose of the study is to determine if there are elevated concentrations of PM and toxic metals in the vicinity of the CASS facility. There is a mix of residential as well as light and heavy industry near CASS. In addition, two schools are located a few blocks east of the CASS fence line.

Initially, the Air District performed a health risk analysis of impacts from the CASS facility on the surrounding neighborhoods. Inputs to the modeling included stack emissions from CASS determined from a recent stack test, and meteorology from the nearby East Bay Municipal Utility District (EBMUD) meteorological station. The modeling showed that the highest concentrations of metals occurred east of the facility. Modeling results were then used to calculate cancer risk for West Oakland residents. The analysis showed that the CASS emissions increased cancer risk by less than one in a million (0.35 per million) and that the increased chronic hazard risk index was significantly less than one (0.002). Fugitive emissions were not included in the analysis. Following that, modeling results were compared with ambient concentrations.

The objectives of the sampling part of the study are to:

- Measure PM and metals concentrations near the CASS recycling facility.
- Determine whether PM or toxic metals measurements near CASS are elevated relative to West Oakland and Bay Area backgrounds.
- Compare measurements collected during this study with prior health risk assessment modeling conducted by the Air District.
- Estimate contributions from CASS.
- Use annual data to assess health risk, applying methods, unit risk factors, and reference exposure levels from the Office of Environmental Health Hazard Assessment.
- Compile a report synthesizing all available information and summarizing findings.

Measurements began in August of 2009 at three sites near CASS and will continue for one year. One site is located west—predominantly upwind—of the facility, another site will be east—downwind—nearer to the CASS facility at the ASA Academy school, and the third site is further east at EXCEL High School. CASS also funded a second upwind site for the first three month period in 2009. Samples are collected using MiniVol sampler, operated for 24-hours on a 1-in-6 day schedule. After collection, samples are sent to the Desert Research Institute (DRI) at the University of Nevada, Reno for analysis. The elements which are analyzed are listed in Table 18.

Table 18. Elements Measured for the West Oakland CASS Study.

Antimony	Europium	Nickel	Sulfur
Arsenic	Gallium	Niobium	Tantalum
Aluminum	Gold	Palladium	Terbium
Barium	Hafnium	Phosphorous	Thallium
Bromine	Iron	Potassium	Tin
Cadmium	Indium	Rubidium	Titanium
Calcium	Iridium	Samarium	Tungsten
Chromium	Lanthanum	Scandium	Uranium
Cobalt	Lead	Selenium	Vanadium
Copper	Manganese	Silicon	Yttrium
Chlorine	Molybdenum	Silver	Zinc
Cerium	Magnesium	Sodium	Zirconium
Cesium	Mercury	Strontium	

Data from the three sites near CASS, plus the 3-month CASS site, will be compared with data from seven additional sites operated as part of the West Oakland Monitoring Study (see description of the West Oakland Monitoring Study). CASS data will also be compared with data from the West Oakland, Livermore, Vallejo, and San Jose monitoring sites where similar metals analyses are available.

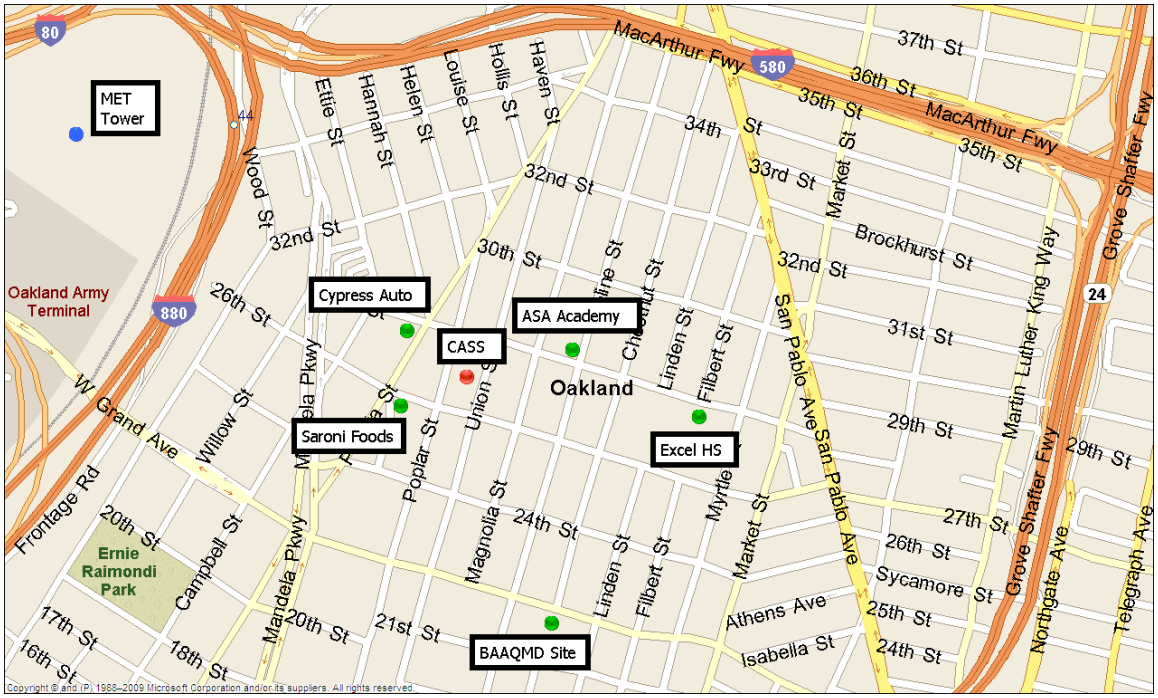

Figure 7. Map of CASS Site with Monitoring Locations and Meteorological Station.

Attributing air pollutants collected from ambient samples to specific sources can be a challenging task. The success of source attribution will depend on how unique emissions from the CASS facility are relative to surrounding sources. The Air District will examine the relative amounts of metals collected on filters during upwind and downwind periods, using wind data from the Oakland sewage treatment plant.

If there is a statistically significant difference in the relative concentrations of toxic metals between upwind and downwind samples, then further analysis will be undertaken to determine if the downwind sample resembles the stack source samples collected from CASS in 2007. Other facilities, such as Central Concrete and a nearby art studio that operates ceramic kilns, could also be a source of metals but presumably with a distinguishable source mix.

West Oakland Measurement Study

In 2009-10, the Air District and the Desert Research Institute (DRI) conducted the West Oakland Measurement Study (WOMS) to measure diesel emissions and other toxic air contaminants within the West Oakland area. The Air District invited DRI to collaborate on the project due to DRI's experience in a similar study in Los Angeles. Although the principal focus of the study was the measurement of emissions from the Port of Oakland, other significant toxic sources in West Oakland were also included in this study. The study is part of the Air District's Community Air Risk Evaluation (CARE) program which evaluates and reduces health risks associated with exposures to outdoor toxic air contaminants in the Bay Area.

West Oakland was selected for the study because a Health Risk Assessment (HRA)[1] produced jointly by the Air District and the California Air Resources Board concluded that ambient concentrations of diesel particulate matter in the West Oakland area were almost three times higher than typical levels in the Bay Area. High diesel emissions in that area were also confirmed by the Air District's emission inventory. Diesel particulate accounts for 80% of the cancer risk from airborne toxics based on findings from the CARE Program. The primary diesel sources include large ships that dock at the Port of Oakland, service trucks that move shipping containers and other freight around at the port, passenger and freight train service, the Union Pacific and Joint-Intermodal rail yards, the Amtrak passenger service maintenance yard, and concentrated heavy duty trucks that transports goods to or from the port and other industries in or near West Oakland.

Currently, there is no method to directly measure ambient concentrations of diesel particulate. However, black carbon (soot) and organic/elemental carbon measurements can be used as a surrogate to approximate diesel concentrations. Other toxics compounds associated with diesel combustion including criteria gases such as NO_2 (and NOx) and SO_2 were also measured.

To build a complete and representative 'snapshot' of the air toxic exposure in West Oakland, the Air District and DRI set up a dense monitoring network which was operated over relatively short periods of time. The three main objectives of the study were to:

- Evaluate spatial and seasonal variations of toxic air contaminants and particulate matter concentrations within West Oakland based on their proximity to known sources including the Port of Oakland, arterial roadways, and California state highways.
- Analyze the particulate composition and determine the source contribution of gasoline and diesel vehicles to ambient particulate concentrations.
- Evaluate community exposure to toxic air contaminants and identify emissions hotspots.

[1] California Air Resources Board. (2008). "Diesel Particulate Matter Health Risk Assessment for the West Oakland Community." Available on-line at: http://www.arb.ca.gov/ch/communities/ra/westoakland/documents/westoaklandreport.pdf

Local wind data showed that there are seasonal changes in the wind pattern. To evaluate the seasonal variations, four weeks of sampling were collected to characterize summer conditions from July to August 2009 and winter time conditions from December 2009 to January 2010. Figure 8 shows the West Oakland sampling locations that were used during both seasonal sampling periods.

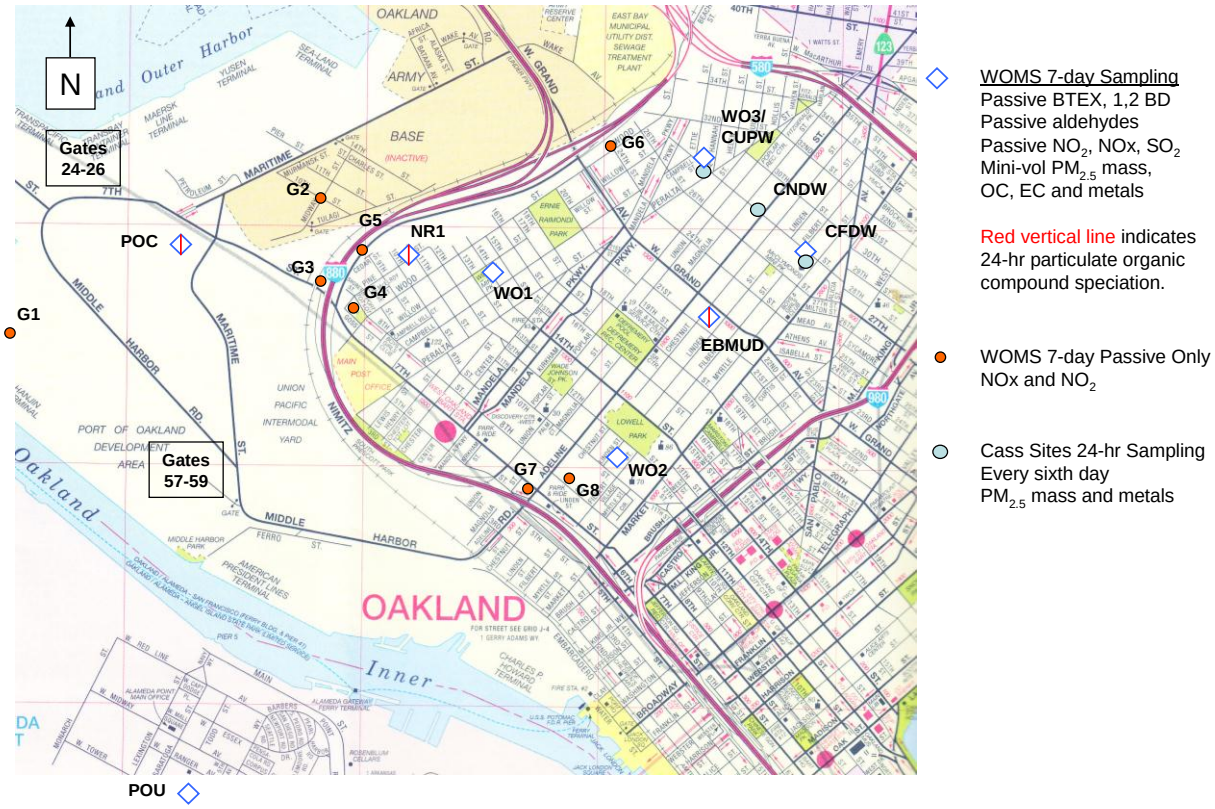

Figure 8. West Oakland Measurement Study Sampling Locations.

The WOMS included measurements with continuous, 24-hour, and 7-day sampling durations. Continuous measurements were made using a mobile monitoring van that moved from place to place within West Oakland, recording a set of pollutant concentrations at specific locations and times along a fixed route. The measurement route was preselected based on the preliminary pilot study and driven twice per day in the morning and afternoon on selected days of interest. The van measurements included O_3, NO/NO_2, CO, volatile organic carbon (VOC) estimates , black carbon, $PM_{2.5}$ mass, particle size distributions and ultrafine particle number concentrations. The study used the data from the West Oakland monitoring station at EBMUD as a reference for comparison to measurements collected from the saturation monitoring. West Oakland concentrations were also compared with data from the Air District's toxic network and $PM_{2.5}$ Speciation Sampling Program to determine how West Oakland compares with the rest of the Bay Area.

At three WOMS sites (one at the Air District West Oakland air monitoring station), 24-hour Teflon and quartz filters collected particulate samples on preselected days over the course of the four week study using sequential filter samplers. The filters were analyzed for daily concentrations of $PM_{2.5}$ mass, organic and elemental carbon, and organic carbon species. Another set of 24-hour glass filters and resin cartridges were exposed on the same days to measure polycyclic aromatic hydrocarbons, alkanes, hopanes, steranes, and polar compounds. The Chemical Mass Balance receptor model will be applied to these speciated particulate data to estimate the source contributions of diesel particulate matter, gasoline combustion, wood smoke, and cooking emissions.

Long-term exposure (7-day composite) measurements were made at 15 WOMS locations plus an additional site that was part of a supplemental study being conducted at Custom Alloy Scrap Sales (CASS). These measurements were designed to estimate the exposure of local populations to the different pollutants and show the concentration gradients of these contaminants throughout West Oakland. Active sampling methods were used at eight measurement sites where ambient air flow was drawn through quartz or Teflon filters. The quartz filters were analyzed for total $PM_{2.5}$ mass, and for organic and elemental carbon concentrations. The Teflon filters were analyzed for $PM_{2.5}$ mass as well as metals using X-ray fluorescence. The CASS study is a separate year-long metals exposure measurement study that was conducted at the same time in West Oakland and provides supplemental metals data. The CASS study is discussed previously in this report.

Passive (diffusion) samplers were employed at 16 study area sites to measure 7-day integrated samples of NOx, and NO_2. SO_2, BTEX (benzene, toluene, ethylbenzene, and xylenes), and carbonyl compounds (formaldehyde, acetaldehyde and acrolein) were also measured using passive samplers at the same eight sites where 7-day composite samples were collected. After each 7-day exposure period ended, passive samplers were analyzed by a laboratory and average pollutant concentrations estimated over the exposure period. Passive sampler performance was evaluated against the co-located 24-hour filter samplers during times both sampler methods were used.

Meteorological data for WOMS was provided by the Air District's meteorological station located at the EBMUD sewage treatment plant approximately one mile northeast of the study area near the Bay Bridge toll plaza. The station provided high quality hourly wind speed, wind direction, and ambient temperature data representative of the entire WOMS area.